

NETWORK WORLD

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HP mini gets server role, host links

By Jim Brown
Senior Editor

BOSTON — As expected, Hewlett-Packard Co. last week used the Interex HP Computer User's Conference here to announce products that enable HP 3000s running the MPE/XL operating system to act as servers in Novell, Inc. NetWare and Microsoft Corp. LAN Manager networks.

The Palo Alto, Calif.-based firm also announced software that bolsters the HP 3000's ability to communicate with other systems on Transmission Control Protocol/Internet Protocol, Open Systems Interconnection and IBM Systems Network Architecture nets ("HP to pitch products that position minis as servers," *NW*, Aug. 20).

HP said it will retrofit its proprietary MPE/XL to conform to Portable Operating System Interface (POSIX) standards. POSIX defines a set of interfaces developers can use to build applications that run under any POSIX-compliant operating system.

The moves will enable the widely used HP 3000 to support a broad range of applications based on de facto and actual communications standards while support-

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John Hancock's Sharon Wall talks about the insurance company's SDN cutover and Tariff 12 plans. See story, page 2.

GM, EDS look to future with strategic net projects

By Barton Crockett
Senior Editor

PLANO, Texas — As the sixth anniversary of their marriage nears, General Motors Corp. and Electronic Data Systems Corp. (EDS) are forging ahead with major network projects vital to the automaker's future.

Among the most important of these undertakings is the C4 project, which is designed to shorten product development and factory retooling time, as well as slash production costs by enabling GM employees and suppliers to work together more effectively.

As part of the C4 project —

which stands for computer-aided engineering, computer-aided design and manufacturing, and computer-integrated manufacturing (CIM) — engineers at GM and supplier sites will be equipped with common workstations and software. They will be able to exchange design and manufacturing data electronically over GM's nationwide network.

"[C4] is absolutely critical for GM because they have much longer product delivery cycles at this point than the Japanese have," said Hartmut Burger, division vice-president of technical infra-

(continued on page 10)

IBM broadens net options for AS/400

Vendor rolls out Ethernet interface, support for 16M Token-Ring and enhanced TCP/IP support.

By Tom Smith
New Products Editor

NEW YORK — IBM last week bolstered the multivendor networking capabilities of its AS/400 minicomputer line with the introduction of an internal Ethernet interface, 16M bit/sec Token-Ring Network support and enhanced TCP/IP support.

Last week's announcements here included several wide-area communications enhancements for the AS/400 family, among them facsimile capabilities and support for X.25 under Transmission Control Protocol/Internet Protocol.

Users get new AS/400 low-end models, ISDN PRI interface. Stories on page 69.

The new internal Ethernet interface enables the AS/400 to reside directly on an Ethernet instead of requiring use of an IBM 8209 LAN Bridge.

The Ethernet/IEEE 802.3 CSMA/CD LAN Adapter, which ranges in price from \$4,000 to \$5,945, is slightly less expensive than the 8209 LAN Bridge, which costs \$6,450. It does, however, eliminate the need to install a To-

ken-Ring adapter in the AS/400 to support a bridge link to an Ethernet.

The Ethernet interface supports TCP/IP and IBM's LU 6.2. TCP/IP lets users communicate with other computers supporting

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Inside

Network Innovators

New feature spotlights the personalities shaping the network world. See page 71.

FCC: AT&T is regaining lost ground

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — For the first time since 1987, AT&T has stemmed its losses in the switched services market and has begun to win back business, according to a report issued by the Federal Communications Commission last week.

AT&T increased its share of interstate switched minutes of use from 63.8% during the fourth quarter of 1989 to 64.3% during the first quarter of this year. AT&T carried 47.1 billion minutes of switched interstate traffic in the quarter, compared with 26.2 billion minutes for all other carriers.

Analysts agreed that AT&T's regaining of market share is likely to continue, but they had mixed opinions as to whether it will benefit users. Some feared that a bigger market share could give AT&T more opportunities to manipulate service prices.

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NETLINE



T-1 MUX MAKERS upgrade voice compression capabilities to slow user migration to virtual private nets. Page 2.

SYNOPTICS UNVEILS 16M token-ring offerings that work over regular telephone-type wire. Page 2.

MCI SPEEDS UP digitization of its long-haul network, a move that will mean a big write-down for the carrier. Page 4.

N.Y. NET MANAGERS reflect on lessons learned from the power outage that hit Manhattan's financial district. Page 4.

BENHAMOU TAKES OVER as 3Com's CEO. Page 4.

OH, THE JOY of linking multi-vendor equipment. Page 42.

INDUSTRY INNOVATOR Alan Huang talks of his passion for optical computing. Page 71.

FEATURE



Voice mail systems save users time and money

By Salvatore Salamone
Features Writer

A few years ago, voice-messaging systems were seen as little more than answering machines for the office. But that's changing as users take advantage of advanced voice-messaging capabilities to provide better service and faster response to clients and customers.

Additionally, firms using

voice-messaging systems are realizing cost benefits and improvements in efficiency. One example of this is the reduction in telephone tag, which leads to savings in time and money (see "The benefits of voice messaging," page 59).

A caller reaching a company that uses some of the more common features offered by voice-messag-

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T-1 mux makers boosting compression capabilities

Mux vendors hope enhancements will increase private net appeal, stem migration to public net.

By Bob Brown
Senior Editor

T-1 multiplexer makers are upgrading their voice compression offerings in an effort to stem the migration of users to virtual private networks and to bolster the appeal of private nets overseas, according to industry watchers.

By upgrading voice compression capabilities, T-1 equipment vendors hope to convince users that carrying voice traffic on private nets is more economical than moving it to virtual private networks or other public net offerings.

"The long-distance carriers and the Bells have done a good

job of pushing [virtual private nets] and Centrex, and we're seeing a shift where not all users want total control of the network," said Roger Chrisman, a founder of Network Equipment Technologies, Inc. (NET) who has since left the company. "T-1 makers are scrambling to find something better and different."

The moves also enable the vendors to better position their products in overseas markets. Voice compression could help net users abroad cram more calls onto high-priced leased lines.

"International circuits are so expensive that users have to consider the advanced compression
(continued on page 70)

John Hancock completes cutover from WATS to SDN

Change expected to save firm \$1.2m annually.

By Bob Wallace
Senior Editor

BOSTON — John Hancock Mutual Life Insurance Co. has completed a nationwide virtual network cutover and is negotiating a Tariff 12 agreement with AT&T as part of an ongoing effort to cut costs and provide end users with advanced services.

In an interview here with *Network World*, Sharon Wall, field systems operations manager for John Hancock, said the company will save \$1.2 million annually by migrating its more than 400 claims and sales offices from WATS services to an AT&T Software-Defined Network (SDN).

She said SDN has enabled the insurance firm to reduce its average cost per minute to as low as 7 cents for calls between high-volume locations with dedicated access to SDN. John Hancock has also used SDN's advanced routing features during emergencies to bypass disabled offices.

The company is considering implementing SDN's Software-Defined Data Network (SDDN) service, which enables users to establish high-speed switched data links on demand.

Wall said John Hancock is also negotiating a custom net deal under AT&T's Tariff 12.

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SynOptics adds 16M boards for unshielded wiring nets

By Laura DiDio
Senior Editor

MOUNTAIN VIEW, Calif. — SynOptics Communications, Inc. last week introduced two 16M bit/sec token-ring local-area network products that support unshielded twisted-pair wire and twice the number of users on a single token ring as similar LANs.

SynOptics is only the second company to introduce 16M bit/sec token-ring products that enable customers to use existing telephone-type wire to support high-speed token-ring nets.

The SynOptics LattisNet boards, the LattisNet Model 3502A Shielded Twisted Pair/Unshielded Twisted Pair (STP/

UTP) and the 3505 Token-Ring Host Module are 12-port boards — one passive and one active — that plug into SynOptics' existing System 3000 intelligent wiring hub.

Multiple token-ring LattisNet boards can be installed in a 12-slot System 3000 chassis, making it possible for a concentrator to support as many as 144 users on a single star-wired token ring.

This is double the maximum of 72 users that is currently supported by other vendors' 16M bit/sec token-ring LANs, including IBM and Proteon, Inc., according to John Armstrong, SynOptics token-ring product manager.
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Briefs

AT&T files 60th Tariff 12. AT&T reached another milestone recently when it filed its 60th Tariff 12 deal. So far this year, the carrier has filed 30 custom network plans — four more than it filed in the entire year of 1989. The customer's name was not revealed for the latest custom network deal, but within the last few weeks, AT&T has filed four other multimillion-dollar plans believed to be for National Data Corp., Chevron Corp., PepsiCo, Inc. and Hyatt Corp. The latest deal is worth a minimum of \$6.7 million annually for five years. It will have 280 data lines at 9.6K bit/sec or below, two lines at 56K bit/sec and one line at 64K bit/sec. The arrangement includes switched voice, 800 service and private lines to be used for voice. AT&T projects it will make \$2.27 million on the deal over five years.

Informix On-Line with NetWare. Informix Software, Inc. last week said it will announce at NetWorld in Dallas next month a version of its Informix On-Line data base management system software that will run on Novell, Inc.'s NetWare 386. The software will support client/server computing in which data base applications running on microcomputers request data from servers. The server will only download the requested data as opposed to downloading a whole file and forcing the microcomputer to search for the requested data.

Informix said Novell lent assistance in building the NetWare Loadable Module for its Informix On-Line DBMS, which will compete against Novell's Btrieve and NetWare SQL DBMSs. Informix On-Line for NetWare will provide a connection to Informix On-Line DBMSs running on Unix-based minicomputers, which will let users distribute data bases across multiple computers and operating systems.

Info services argument continues. The regional Bell holding companies, the Department of Justice and the Federal Communications Commission last week took the first step in the rehearing of their case to have the information services restriction lifted from the RBHCs. The three parties filed briefs with U.S. District Court Judge Harold Greene insisting that the FCC has adequate safeguards to prevent anticompetitive activities if the restriction is lifted.

Greene is rehearing arguments on the informa-

tion services ban because an appeals court earlier this year overturned his ruling in 1987 in which he decided the ban should be maintained. The appeals court upheld his decision to continue to ban the RBHCs from the provision of long-distance service and manufacturing of equipment.

AT&T to extend reach of Accunet. AT&T told the Federal Communications Commission it wants to expand its International Accunet Packet Service to China, Greece, Liechtenstein and Thailand beginning Aug. 31. The carrier said it had negotiated agreements with telecommunications administrations in the countries for reciprocal service. The international packet net service was previously available to 39 countries. Charges for Greece, Liechtenstein and Thailand will be \$6 per kilosegment plus \$6 per hour of use. Charges for China will be \$8 per kilosegment plus \$8 per hour of use.

Use a card, any card. Cirrus System, Inc. and Plus System, Inc. last week began using a link between their on-line transaction processing networks that makes their automated teller machines available to each other's cardholders. The link could make it possible for Cirrus or Plus cardholders to get cash from as many as 60,000 ATMs nationwide, thus enabling banks that are members of either network to easily expand the number of ATMs that accept their cards. Individual member banks own the bulk of the ATMs in both national networks. Cirrus has about 33,000 ATMs, while Plus has about 27,000.

PCN partners team in D.C. The Washington Post Co. announced its intention to invest approximately \$5 million in a joint venture with Baltimore-based American Personal Communications, Inc. (APC), which holds an experimental Federal Communications Commission license to conduct personal communications network (PCN) field trials with wireless pocket telephones in the Washington/Baltimore region. As envisioned, the joint venture would combine APC's technical expertise with a service and billing solution developed by Washington Post. A Post spokesman said the company views the market for PCN services to be potentially as vast as today's market for cellular car phones.

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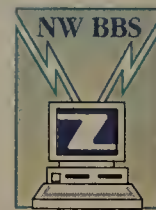
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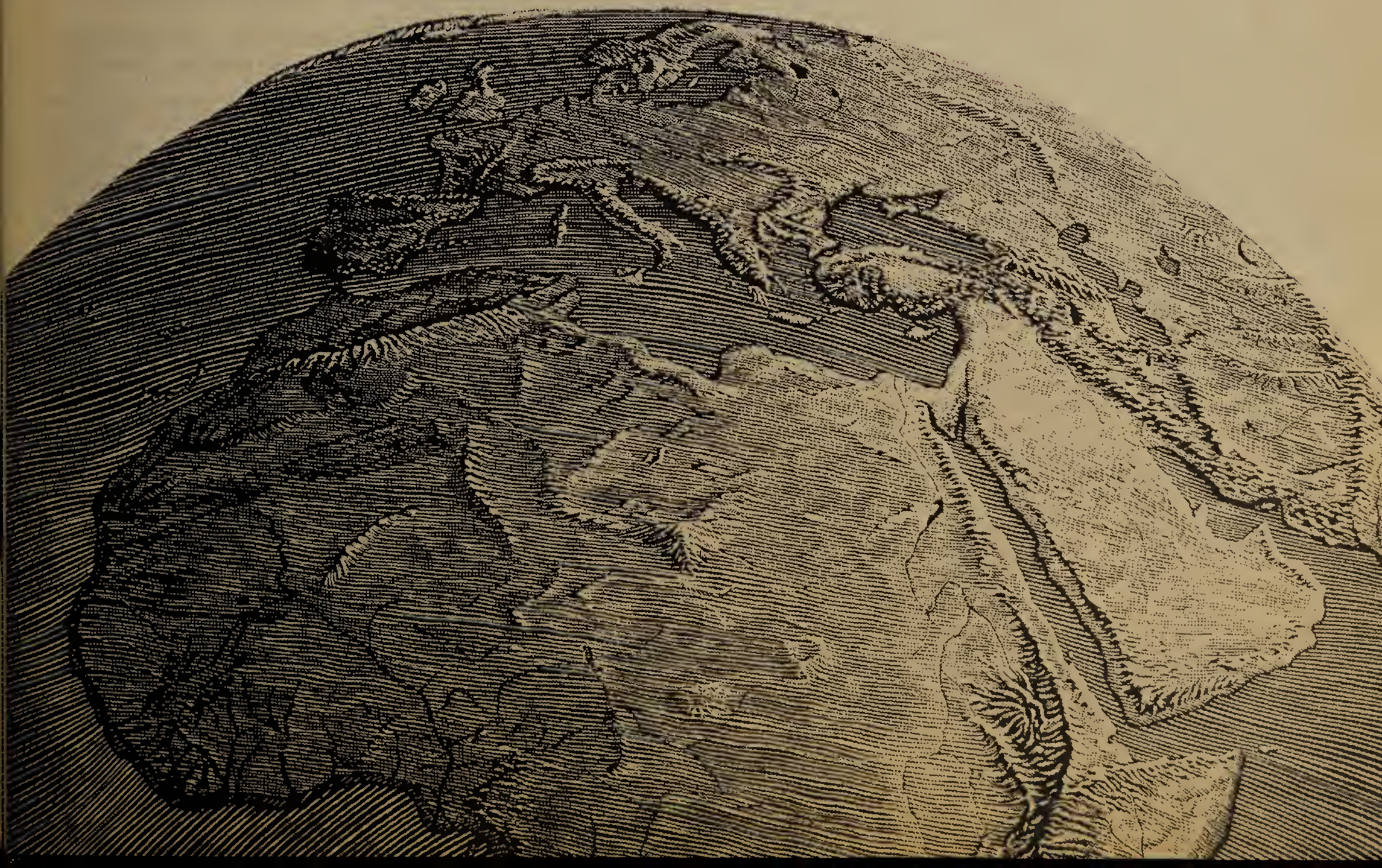
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MCI says it will accelerate net digitization by 2 years

Carrier plans \$1.1b upgrade investment in 1991.

By Bob Wallace
Senior Editor

WASHINGTON, D.C. — MCI Communications Corp. last week announced plans to accelerate by two years the digitization of its nationwide network in order to give users higher quality voice and data transmission services.

Digitization of the MCI network is now scheduled to be completed by the end of 1991, a move that will enable MCI to catch up to US Sprint Communications Co., which runs an all-digital net, and AT&T, which expects to eliminate its last analog links by year end.

As part of the plan, MCI said it will spend \$1.1 billion in 1991 on its network, assimilate 3,000 route miles of fiber from its merger with Telecom*USA, Inc. and acquire additional digital links under a capacity exchange agreement with national carrier Williams Telecommunications Group, Inc. (WilTel).

As a result, MCI is considering taking a \$500 million to \$550 million onetime write-down in

the third quarter to retire aging analog transmission equipment, which the carrier said is more expensive to maintain than newer digital equipment. But MCI declined to say whether it will definitely take the write-down or how such a move would affect earnings.

Expansion plan

The investment scheme builds on plans MCI revealed last July when it said it would spend more than \$1 billion in 1991 to upgrade its network.

The money will be used for network expansion, a signaling system upgrade, installation of new T-3 digital access and cross-connect systems, and improvements to the carrier's Digital Data Network ("MCI allots funds for net expansion, improvements," NW, July 2).

Robert Heinze, senior principal specialist for McDonnell Douglas Aerospace Information Services Co. in St. Louis, applauded MCI's network digitization and

spending plans.

"That's great news," Heinze said. "I'm pleased to see that MCI is spending so much to improve its network."

The MCI net, which represents an investment to date of \$7 billion, is twice the size in route miles of US Sprint's network but has less fiber.

Before its recent \$12.5 billion merger with Telecom*USA, MCI's 46,000-route-mile network included 17,000 fiber route miles, 16,000 analog microwave route miles and 13,000 digital microwave route miles.

MCI picked up 3,000 more fiber route miles through the merger to bring its total fiber route miles to 20,000, which is still less than AT&T with 31,400 fiber route miles and US Sprint, which runs a net consisting of 23,000 fiber miles.

MCI's agreement with WilTel, the terms of which were not disclosed, will give each carrier access to the other's network. This will enable the carriers to expand the reach of their networks and offer users greater route diversity without making large capital expenditures.

In the past, MCI and Telecom*USA each bought capacity on WilTel's 11,000-mile fiber and

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serve Bank of New York, Dow Jones & Co., Inc. and Citibank, N.A.

Of these users, Citibank appeared to be hit particularly hard. In addition to causing the bank to delay several vital funds transfers until late in the evening one day during the outage, a failure in a backup generator at a data center on 111 Wall St. shut down many of the bank's local processing systems for retail bank operations.

Bad timing

According to a spokeswoman, this led the bank to fall 24 hours behind in processing deposits to checking accounts in New York. She said this was particularly troublesome because it happened on Aug. 15, just as many customers were getting paychecks electronically deposited to accounts.

As a result, the spokeswoman said, many customers could not withdraw money from their accounts through automated teller machines and had to stop by bank offices to get funds.

She declined to say if Citibank is reevaluating its testing procedures for backup diesel generators. But many users said these and other failures could have been prevented if diesel generators had been properly tested.

"You've got to fire them up, run them at full force and check all the machinery thoroughly," said a user with a major brokerage firm who requested anonymity. "If you test them right, this should never happen. I think lots

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3Com's Benhamou takes over CEO slot from Krause

By Susan Breidenbach
West Coast Bureau Chief

SANTA CLARA, Calif. — Eric Benhamou continued his ascension at 3Com Corp. last week as company Chairman Bill Krause relinquished to him the position of chief executive officer.

Krause — who ran 3Com from its start-up days in 1981 until last April, when he named Benhamou president and chief operating officer — will stay on as chairman. Benhamou's latest promotion, which was unanimously approved by 3Com's board of directors last week, takes effect Sept. 20, the day of 3Com's annual shareholders' meeting.

This year is turning out to be a very good one for Benhamou, who is given much of the credit for the shake-up at the end of 1989 that got 3Com back on track after it stumbled badly last summer. In January, Benhamou was named to a three-member executive team that took over much of the management of the company. The executives were all candidates for the post of president; Benhamou was given the job three months later.

"In December, a month before we announced the troika, the board had a pretty good idea that

Eric was the front-runner," Krause said. "He had been the architect of our renaissance plan and the main spokesman of the management team. We did the troika to make sure and then proceeded to put him in charge."

The renaissance plan, which has been in effect since the beginning of the year, is essentially aimed at returning 3Com to its data networking roots. The renaissance effort ended a two-year attempt by 3Com to become more of a computer systems company, which led to 3Com's financial woes last summer ("3Com report stuns local net market," NW, Aug. 14, 1989).

The almost religious focus on network operating systems, servers and workstations drove away most of the management team 3Com had acquired along with Bridge Communications, Inc. in 1987. However, Benhamou, who cofounded Bridge in 1981, elected to stay the course, and his patience has paid off handsomely.

The top tier of Benhamou's management team consists of the two other troika members — Les Denend, executive vice-president of product operations, and Bob Finocchio, executive vice-presi-

(continued on page 6)

Users review disaster plans in wake of N.Y. blackout

By Barton Crockett
Senior Editor

NEW YORK — With electrical power now fully restored to lower Manhattan, some network managers are contemplating the lessons learned from the largest blackout here since the outage that darkened much of the Eastern Seaboard in 1977.

In the wake of an outage that cut off power to some 2,600 Consolidated Edison Co. of New York, Inc. (Con Ed) customers for up to eight hours and another 1,500 customers for up to six days, some users are thinking about moving their data centers and network hubs out of the city.

Others are rethinking test procedures for emergency generators to ensure they work when needed ("Manhattan blackout cripples user nets," NW, Aug. 20).

Tari Schreider, president of the disaster recovery consulting firm Contingency Planning Research, Inc. in Jericho, N.Y., said inspections by his company revealed that more than 300 data centers supporting financial services firms were knocked out when the outage first hit.

Nearly 120 of these remained without power for three days, while 48 were powerless for six days.

Users said networks were disrupted on a level unseen here

since the 1977 blackout.

Frustrated with the length of the service disruption, many users said the outage might make some companies move critical information systems operations out of the city altogether.

"I think there's going to be a lot of reanalysis [about keeping data centers and network hubs in the city]," said John Lee, president of the New York Automated Clearinghouse.

About 25 of the 140 banks that subscribe to its Clearinghouse Interbank Payments System funds transfer net were affected by the outage.

Lee said the blackout, in combination with other infrastructure difficulties in New York, including problems with public network facilities, could become the last "straw on the camel's back" that causes users to move data centers and network hubs out of the city.

Diesel backup

Other users said they will now focus their energies on fully testing backup diesel generators to ensure that they can be relied upon following disasters.

Several companies' backup diesel generators failed, forcing them to move critical data centers to backup facilities and to shut down some operations. Among them was the Federal Re-

MCI boosts MCI View net monitoring capabilities

Enhancements improve users' ability to monitor virtual network and data services via NetView.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — MCI Communications Corp. last week announced enhancements to its MCI View network management service that improve users' ability to monitor Vnet and Terrestrial Data Services (TDS) traffic from an IBM NetView management station.

Unlike earlier versions of MCI View that only displayed an alert indicating a network problem, Version 1.5 of the service describes network problems in detail and offers specific advice on resolving them.

MCI View now provides new network alarms and traffic status alerts for MCI Vnet locations using dedicated access facilities. These alarms indicate potential service outages or conditions that impair traffic, MCI said. Alerts are also delivered to customers according to preprogrammed priority levels, ensuring that users view critical faults first.

The service also provides detailed information about alarm conditions generated on TDS 1.5 circuits. Data on the specific type

of alarm, direction, location and priority level is now available to the customer.

Version 1.5 provides such details as notification that the alarm was due to a signal loss, upstream failed signal, frame slip or out-of-frame problem, which results when framing errors occur in transmission.

"We tell them where the alert was generated, perhaps at the originating point of presence [POP] or the terminating POP, as well as what direction — on the interexchange side or the customer premises side of the POP," said Jay Simon, senior manager of network management marketing at MCI. He added that such detail enables users to immediately isolate faults.

MCI said it plans to extend MCI View next year to support 800 and 900 services as well.

In addition, the carrier has upgraded the internal system that delivers the network management information to the customer. Before, MCI's monitoring system would pass data to a personal computer running NetView/PC,

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The Best Connections in EuropeSM

SynOptics adds 16M boards for nets

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keting manager.

The LattisNet Model 3502A STP/UTP board is a passive hub for 4M and 16M bit/sec token-ring nets that use new high-performance unshielded twisted-pair cable from AT&T and Northern Telecom, Inc. That cable is designed to prevent outside noise and radiation from interfering with the signal. The high-grade cable has been engineered to minimize the effects of noise, vibration and signal attenuation, which degrade high-speed token-ring data transmissions that utilize twisted-pair media, said Jerry Eisen, managing director of consulting services at accounting firm

Goldstein, Golub, Kessler Co. in New York.

Passive hubs such as IBM's Multiple Access Units and those in Proteon's 4M and 16M bit/sec token-ring products offer a lower entry-level cost per node and are more reliable than active hubs because they are not vulnerable to power outages, according to Mike Clair, SynOptics' vice-president of marketing.

The passive hub can support concentrator-to-workstation cable runs up to the full 330-ft. distance specified in the IEEE 802.5 token-ring LAN standard.

"What we've done with the Model 3505 is put both an equalizer and a filter on each channel of the board to reduce 'near cross-talk' noise and jitter between the various [unshielded twisted-pair] wires," SynOptics' Armstrong said. "Users can double

the maximum distance between wiring concentrators and workstations to 660 feet if they use the new high-performance AT&T or Northern Telecom [cable] with the active hub," he added.

Proponents of the active token-ring hubs say they favor this approach because it affords users a higher degree of signal clarity compared to passive hubs, which merely pass data packets across the net. "The active approach is important for high-speed token-ring signals being transmitted over [unshielded twisted pair] because the signal is amplified and regenerated at the wiring concentrator. This makes it cleaner," notes Mary Modahl, a LAN analyst at Forrester Research, Inc., a consultancy in Cambridge, Mass. "The reality of most offices is that they include

faxes, printers and soda machines, all of which generate electronic interference and vibrations that can seriously mar and degrade signals."

Both the LattisNet 3502A and the 3505 are available now. The LattisNet 3502A passive board costs \$235 for each workstation connection, and the LattisNet 3505 active board costs \$300 per connection.

Modahl said the two new LattisNet boards and SynOptics' new unshielded twisted-pair technology are good news for the company's users.

"I think it's important that SynOptics has been filling in the gaps in its product portfolio. Until now, it's been perceived as an Ethernet-only company, even though it's been shipping 4M and 16M bit/sec token-ring boards that use shielded twisted wire since last spring. It's critical for them to expand their support for token ring over a variety of media because it means that existing System 3000 users can pursue a consistent wiring strategy using SynOptics as a single vendor," Modahl said.

So far, only two other vendors, Proteon and Ungermann-Bass, Inc., have said they will support 16M bit/sec over unshielded twisted-pair wire, and only Proteon is shipping a product. IBM has said it is considering the matter, but a spokesman said it is against company policy to preannounce products. □

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Benhamou takes over CEO slot

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dent of field operations — as well as Debra Engel, vice-president of corporate services, and Chris Paisley, vice-president and chief financial officer.

"I think Benhamou is excellent, and I'm very comfortable with the whole team," said Alice Bradie, a securities analyst who follows the local-area network market for Hambrecht & Quist, Inc. in New York. "If one of the major responsibilities of a CEO is to set and implement strategy, Eric has demonstrated the ability to do that."

The analyst community in general has been impressed with Benhamou. The only reservation the industry watchers have expressed about him is what they perceive to be a relative lack of experience in the microcomputer arena since his roots are in Bridge's original terminal server business.

"That's simply not true," Benhamou said. "I've spent the last three years in the PC business. I feel at least as confident in the PC arena as I do in what used to be Bridge's traditional business."

Benhamou's succession as 3Com's CEO is the definitive end of what Krause calls "the Bill and Bob show," a reference to the tight management partnership formed by himself and 3Com founder Bob Metcalfe, who resigned last June. It is also supposed to mark the beginning of what Krause calls the third phase of his professional career.

"The first phase, learning about business, was my 14 years at Hewlett-Packard Co. The second phase was the growing phase, growing my own company and personality. This phase, which has lasted nearly 10 years, has resulted in a \$420 million company with 2,000 employees."

That brings Krause to the third phase of his career, which he designates "the serving phase." But he scotched rumors that he is planning to run for public office. "I don't think I have the temperament for that," he said, though he acknowledged that he wouldn't mind being appointed to a position in public education. □

See The FAXNeT Form on Page 60

The big one that got away.



Not long ago, Mr. Horace Abercrombie, head buyer for a large chain of seafood restaurants, made an important phone call to his *then* major fish supplier. It seems that with all of the excitement of planning a two-for-one promotion, Horace had completely overlooked ordering a couple of extra tons of delectables from the deep.

Horace dialed his supplier and heard, "Please wait for the next available operator." He did as he was asked, and waited. And waited. Soon, Horace developed a frustration that even the soothing pan flute music in the background couldn't assuage.



Horace began to panic that this delay would put his promotion in jeopardy. That's when he remembered a visit from Forward-Thinking Fresh Fish Inc.

Locating the energetic young salesman's card next to the antacid in his desk drawer, Horace hung up and then dialed Forward-Thinking's number. Upon hearing, "Please hold and a representative will be with you in two minutes," he sighed with relief.

You see, since he knew *when* his business would be tended to, he didn't get uptight. Before long, Forward-Thinking had reeled in a new account. And Horace's old supplier had let a big one get away.

There's a moral to this fish story.

If your company's ACD isn't helping

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Not keep customers holding.™

you service clients quickly and efficiently, they could be lured away by the



competition. That's why we developed IQueue™ — a revolutionary new capability for Rockwell's industry-standard Galaxy™ ACD systems.

Keep your callers informed and they'll be hooked for life.

Just like Horace, callers tend to get a bit impatient waiting on ordinary ACDs. IQueue, on the other hand, tells them how long they'll be on hold.

The announced time is based on real-time statistics. And since your callers know what to expect, they're less likely to be frustrated and more likely to hold the line.

A new angle on saving time and toll charges.

With IQueue's upcoming Automessage Delivery™ feature, your callers will be able to leave a message that holds their place in queue. IQueue will then automatically return the call. All of this means your company saves on toll charges incurred from holding.

May we lure you into a FREE demonstration?

We could go on and on about how smart IQueue is. But there's really only one way for you to find out. Just call us at **1-800-722-5959** to arrange a free demonstration. We'll be glad to show you why IQueue not only keeps the big ones from getting away, it actually makes them delighted that they're caught.



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CALL PROCESSING



"My ultimate PC system? Well, for starters, it's got to be compatible with everything I've got already... so you can take a floppy from an old PC, pop it into a new one, and it will work."



"Networking PCs is a major pain. I'd like to see PCs designed to do networking without lots of configuration work... and still connect with all the networks I've already installed."



"We've got plenty of data... the challenge is to put it in the hands of decision makers in a form they can use. The perfect PC would be an ideal client to all my information systems."



"Every time I turn around, vendors change the operating system or interface. I want to be able to drop the hottest new box on my executives' desks and know their software will run."

Hidden camera reveals the se

Not long ago, we invited hundreds of IS managers to talk about their wildest desires in a personal computer system.

They talked. We listened. We videotaped. And when we got those tapes back to Silicon Valley, popped them in the VCR and started watching, it confirmed what we knew all along.

They wanted a personal computer system that was compatible enough with their existing PCs to trade files on floppy disks. Like Macintosh.[®]

They wanted a system with the power and flexibility to run thousands of business programs and almost any kind of operating system: MS-DOS, Macintosh and UNIX.[®] Like Macintosh.

They wanted a graphical user interface with no compromise in performance. Like Macintosh.

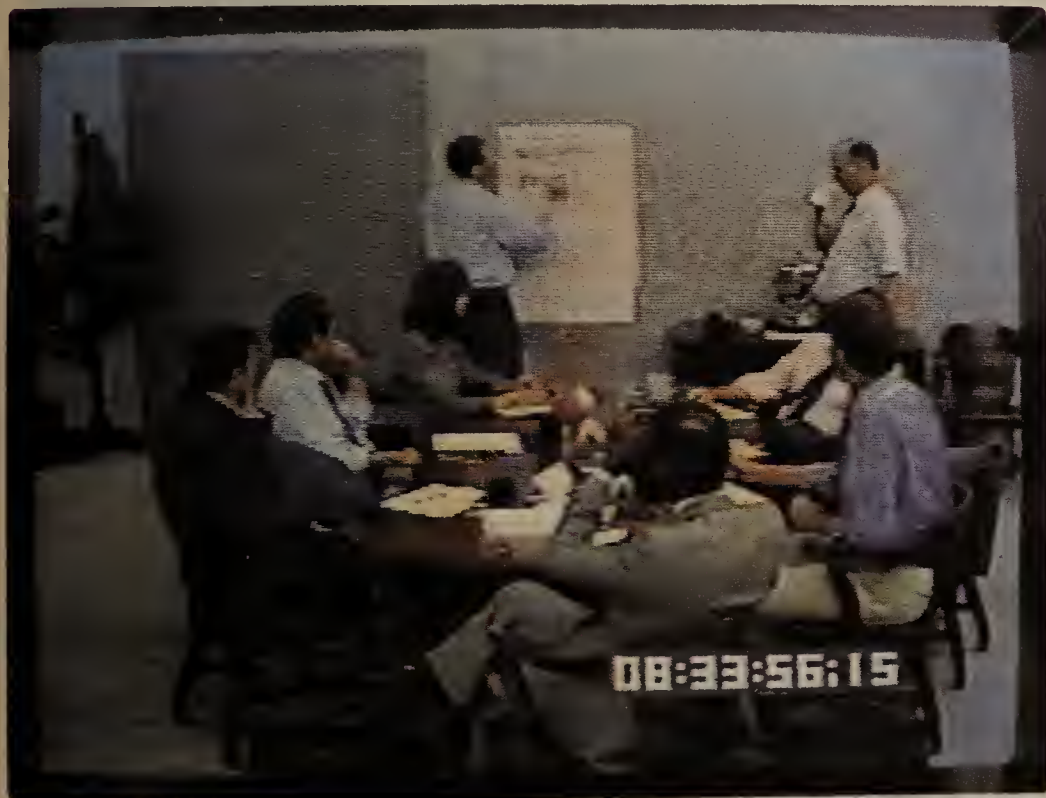
And they wanted all their software to have a single way of working, so training and support costs could be dramatically lower. Like Macintosh.



"A graphical interface is clearly important... users love 'em. But the architecture has to be designed to handle it or the performance compromise is unacceptable."



"I'd like to see more discipline from software developers. Commands should be consistent for every application... it would eliminate the cost of constantly retraining."



"My company's needs go way beyond off-the-shelf software. I need serious development tools my existing programming staff can use to develop custom apps quickly and easily."



"Macintosh? No kidding?"

secret desire of 200 IS managers.

They wanted a system with sophisticated networking capabilities built in, that could let users access almost any host or file server via any kind of network. Like Macintosh.

They wanted all these things in a wide range of personal computers. That would all work the same way and run the same software. Like Macintosh.

And they wanted powerful development tools that would let their existing programming staff build applications quickly

and easily. Like Macintosh.

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Now that we know all of your secrets, it's time you found out about all of ours.



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GM, EDS work through trying years

continued from page 1

structure services at EDS and leader of the network support portion of the C4 project.

Burger, who described C4 as one of the most important information systems endeavors GM has ever undertaken, said no deadline has been set for completion of the project. He and other GM officials declined to discuss the project in greater detail.

Before moving to EDS in 1984, Burger worked nearly 25 years at GM, starting as a tool engineer and advancing to head the automaker's corporate networking department.

GM is already saving millions of dollars annually from the network and data center

consolidation undertaken on its behalf by EDS shortly after the automaker purchased the outsourcing firm for \$2.5 billion in October 1984.

The network that resulted from this consolidation, dubbed EDS-Net, is one of the world's largest voice and data networks and is the information systems platform on which EDS provides its outsourcing services. According to Burger, the C4 project would be impossible without EDS-Net because all communications among engineers using C4 technologies will be carried over EDS-Net facilities.

Before EDS-Net was constructed, each GM division operated its own wide-area network, typically using analog facilities, Burger said. EDS-Net migrated these disparate facilities onto a common digital back-

bone that serves as a shared information highway interconnecting GM data centers and business units.

Burger said GM invested about \$500 million in WAN communications facilities to construct EDS-Net and completed the project in 1987. He said EDS-Net has cut GM's networking bills by such a large amount that the investment has already paid for itself.

Savings from the WAN side are dwarfed, however, by savings from a consolidation of data centers EDS undertook for GM at about the same time.

In all, about 30 to 40 GM data centers, managed separately by different divisions, were consolidated into about six EDS-operated Information Processing Centers interconnected by EDS-Net.

Burger said GM paid EDS \$1 billion to complete the data center consolidation and has already recouped the investment from reductions in personnel, equipment and software expenditures.

Since that time, EDS-Net has expanded to support EDS' growing outsourcing business. The network now supports about 20 large information processing centers and 150 smaller data centers, comprising roughly 300 mainframe processors with about 4,500 million instructions per second of computing power.

The network supports a mix of microwave, fiber-optic and satellite facilities, including nearly 900 T-1 and 131 T-3 lines. About half the network traffic is voice-routed through more than 200 private branch exchanges and one AT&T 5ESS switch, while the rest is data.

In all, some 280,000 data terminals and 250,000 telephones are supported on a network that spans 57 countries. EDS-Net is managed primarily from a single network management center here at EDS' headquarters.

Other major projects that EDS has undertaken for GM include the construction of a centralized health claims processing system that GM's insurance providers access through EDS-Net.

In addition, EDS has worked with GM on several factory automation projects, including a multibillion-dollar effort to install new CIM systems in five GM Truck and Bus Group factories. EDS also took on a consultative role in the construction of a factory network for GM's Saturn project. Saturn is a new line of cars GM plans to begin producing later this year.

Burger said GM would not have been able to handle the network and data center consolidation without EDS. He said divisional disputes kept GM from completing such a consolidation, even though the automaker had contemplated it before the merger.

"In GM, there was talk of this, but there was a constant fight about what it should look like," he said. "Everyone thought it should look like what they had and not what the other guy had."

Charles Frumberg, an EDS stock analyst at Mabon Nugent & Co. in New York, said that with the savings from network and data center consolidation, as well as EDS' strong business performance, the acquisition has proven profitable for GM.

"They brought in much needed discipline to the [GM] organization," Frumberg said.

Painful transition

But realizing these benefits has been painful for GM and EDS. GM had to transfer about 8,000 information systems employees to EDS payrolls, and many of these workers had to be relocated from data centers that were being closed. Burger admits that the transition "was kind of a culture shock" for some GM employees.

In a recently published biography of *(continued on page 68)*



EDS' Harmut Burger



UDS V.32 Modems: winners at 19.2 kbps—now FastTalk doubles the speed

From the day of its introduction, UDS' V.32 modem has gathered honors from leading computer publications and other industry watchers!

Initially it set the standard for 9.6 kbps, full-duplex traffic over dial-up lines. When MNP* level 5 data compression was added, throughput went to 19.2 kbps.

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The modem is particularly useful for bit-intensive data transfers, such as engineering graphics, image processing and complex financial operations. Data Rate is automatically adjusted to 9600, 4800, 2400 or 300 bps (CCITT V.32 and V.22bis). At the 9600 bps rate, trellis coding gives the FastTalk V.32/42b an exceptionally high tolerance for noisy lines.

For accurate communication over

worst-case lines, the unit incorporates V.42 LAP-M and MNP 4 error control functions. A full complement of on-board test functions is included, and eight LEDs provide easy monitoring of the unit's operation and built-in diagnostic features.

Get acquainted with the latest winner in the UDS V.32 family. For technical details and quantity pricing, contact UDS, 5000 Bradford Drive, Huntsville, AL 35805-1993. Telephone 205/430-8000; FAX 205/430-8926.



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See The FAXNet Form on Page 60

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

“AT&T had been aggressively marketing its long-haul business. However, we now believe the company will shift the bulk of its marketing efforts toward its equipment business. As a result, a 1% to 2% loss in market share in its long-distance business could result.”

Ronald Altman
Chairman and
chief executive officer
Altman Brenner Wasserman
New York

People & Positions

MCI Communications Corp. last week announced the appointment of new presidents at three of its regional sales divisions: **Jonathan Crane**, Northeast Division; **Douglas Maine**, Southeast Division; and **Gregory LeVert**, Midwest Division.

The regional divisions serve as the carrier's sales and customer service representatives in their areas.

Crane, who was president of MCI's Southeast Division in Atlanta, succeeds **Nathan Kantor**, an 18-year MCI veteran who announced his resignation two weeks ago.

Kantor plans to start up a telecommunications consulting firm that will offer outsourcing strategies, network and facilities management, service planning and implementation. He will remain with MCI until year end.

Kantor's departure resulted in "something of a domino effect," whereby changes were made at other regional divisions, a spokeswoman said.

Maine will replace Crane as president of the Southeast Division. Previously, Maine was senior vice-president for finance at MCI.

(continued on page 13)

Judge limits trial involving Westinghouse software unit

By Ellen Messmer
Washington Correspondent

NEW HAVEN, Conn. — A judge has decided that plaintiff John McCann must prove fraud in a case against a Westinghouse Communications Software, Inc. (WCS) executive before pursuing additional claims regarding ownership of current products from WCS.

In the latest development in this ongoing legal dispute, U.S. District Court Judge Jose Cabranes granted a request by defendants Oliver MacKinnon Jr. and WCS to limit the scope of an upcoming trial to determine whether MacKinnon, now president of WCS, committed fraud against McCann in 1981, when MacKinnon was head of Communications Design Corp. The trial is tentatively scheduled for October.

McCann claims MacKinnon promised him 35% of Communications Design's stock and a position as vice-president of the company in exchange for ownership of telecommunications management software designed by McCann.

He claims MacKinnon defrauded him of the stock by telling him that Communications Design was in financial trouble and

that McCann's software would have to be scrapped.

McCann also alleges that telecommunications management programs marketed today by WCS are unlawfully based on the software he developed for Communications Design, which was acquired by WCS in 1989.

He is seeking \$65 million in damages from the defendants.

MacKinnon and WCS representatives say McCann's fraud charges are baseless and contend that current WCS software offerings are not based on McCann's original software.

They say that if McCann cannot prove fraud, there is little chance the court will allow him to argue his stolen software claim. They say only a showing of fraud can override the six-year statute of limitations on his software-related claims.

McCann's lawyer claims McCann will pursue his claims against WCS even if he loses the fraud trial.

For now, the judge's decision relieves both sides from having to argue before a jury complex technical comparisons of the software programs, whose rights are ascribed to WCS. Those programs include Communications De-

(continued on page 13)



Adrienne Harrison



Tony Cernuto

Net execs examine purchase decisions

Users discuss top criteria used to select vendor offerings, explain how they qualify suppliers.

NEW YORK — A diverse group of network managers recently met here with *Network World* Editor John Gallant and Industry Editor Bob Brown to discuss the criteria they use to make buying decisions and select vendors, and how those criteria are changing.

On hand to discuss the issue were: Sergio Alonso, manager of information systems at Banco Portugues Do Atlantico; Terry Callender, data communications specialist at Shearson Lehman Hutton, Inc.; Tony Cernuto, communications consultant at Colgate-Palmolive Co.; Adrienne

the MIS budget, and it tended to be a single-vendor shop. If your vendor didn't offer it, you told your user to wait two years and they'll come out with it.

What's happened through the '80s is that users have gotten control of the data processing budget for their own department. The MIS department still has the big budget for the [IBM] 3090, but users now have more control over what they are spending their money on. And they are able to influence the purchasing decisions almost to the exclusion of all else.

Shepherd: Price/performance and functionality are the leading criteria today, especially for an individual application. The ability of the vendor to survive over the long run, plus the ability to interconnect and give us transparency across the net are becoming perhaps more important than the specific price/performance.

Alonso: Price/performance is still an issue, but I think it's more [an issue of] functionality in our case and the ability for the product to be upgraded over time to retain that investment.

Harrison: Functionality is growing in importance faster than anything else. Price, reliability and service were important in the past and still are, but being able to perform a function is very important. Whenever we're looking for [a product], we want it to do something specific.

How important is support for standards in the buying process?

Callender: Standards are important (continued on page 12)



Terry Callender

Harrison, network specialist at Marsh & McLennan, Inc.; and Ron Shepherd, assistant vice-president for emerging technologies at Chemical Bank. (Shepherd is not affiliated with the bank's telecommunications division.)

How have buying decisions changed over time? What are the key criteria today for making purchases?

Cernuto: In the past, the MIS department had total control over

INDUSTRY BRIEFS

US Sprint Communications Co. last week completed a restructuring of its national sales organization to improve sales and service to long-distance customers.

The carrier formed three new groups from the five that formerly comprised US Sprint's National Markets unit. The Business Market Group will offer telecommunications sales and support service to customers spending more than \$100,000 per year. The Consumer Services Group will serve residential customers as well as businesses that spend less than \$100,000 annually. And a third sales group, the National Sales Division, will market long-distance services to small and midsize businesses that spend \$500 to \$10,000 per month.

Systems Center, Inc. of Reston, Va., last week announced it has acquired automated management software for IBM's Application System/400 minicomputer from Houston-based Informed Management Environment, Inc. for \$2.4 million.

Systems Center, which markets the Net/Master network management system for IBM Systems Network Architecture nets, acquired the software to expand its offerings beyond IBM mainframe environments. The software, which Systems Center plans to formally introduce next month, is used to automate several operations on an AS/400, including file backups, security procedures and network management tasks.

In a related move, Systems Center announced earlier this month that it agreed to purchase Reston, Va.-based **Unitech Software, Inc.** for between \$4.5 million and \$6.8 million. Unitech develops and markets network management software for Unix environments.

(continued on page 13)

Net execs discuss purchasing decisions

continued from page 11

tant to us and important if the industry is going to move forward. Ten years ago, if you purchased a modem from Racal-Milgo, the only other modem that would work with that was another Racal-Milgo product. Today, because of the evolution [of standards], we can get a Racal-Milgo modem and put an [AT&T] Paradyne modem on the network with it, and they will speak to each other.

Cernuto: What's happening in my company is we're getting a proliferation of departmental LANs. Each department has a different need, and we're finding a LAN or hardware and software platform to meet

that need. As a network integrator, my position is to get that departmental LAN to speak to the rest of the enterprisewide network. So I'm definitely looking for standards wherever I can.

So when you're buying, that's a key factor along with price, reliability and service?

Shepherd: We're moving much more toward raising standards in terms of importance. Many earlier systems, in the '70s and '80s, were built to stand alone. What's happening now is we've got these different systems and the difficulty of making those systems talk to one another has become

evident enough that we are getting to work on a set of standards that would apply to new stuff coming in. We'll be able to say, "OK, buy whatever you want as long as it talks to the network in this fashion."

In dealing with vendors during the purchasing process, do you have trouble getting a clear picture of how they are going to support standards?

Callender: It varies from vendor to vendor. Big vendors tell you absolutely nothing other than they'll be supporting something in the near future. Smaller vendors tend to say they'll support standards when they see demand for them.

Shepherd: We find ourselves more comfortable with a company that's willing to

commit to standards in a specific time frame and standards that closely match up with the direction [in which] we see our needs going. So we may end up switching vendors or at least putting a higher emphasis on a vendor that is willing to work in a standards-based, open environment.

Do your companies feel comfortable buying from start-up companies that might offer an interesting technology, though you don't know their track record very well?

Shepherd: We'll probably avoid it because they have no track record and the entry price into data processing technology today is very high. Plus with the advent of standards, how well will they work with and support standards in the future? If we have a specific problem that cannot be met any other way, that shades our decision. But if there is any alternate way of solving the same problem without using the start-up company, we'll do that.

Cernuto: If the solution exists from a major supplier, the tendency is to go with the major supplier even though it may be more expensive than going with a competitor that is filling a market niche. But if the so-

“We may switch vendors or put a higher emphasis on one that is willing to work in a standards-based environment.”

▲▲▲

lution is unique and it's cutting-edge technology that can solve a problem for the department or user, the tendency now is to go ahead and bring it in. We'll do a pilot and work with the vendor to customize future releases. [In that case] the financial balance sheet review is not as important.

What if the start-up company had a deal with a larger company to provide financial or marketing support? Would that persuade you to take a chance with a start-up more readily?

Callender: Yes, once a particular product is backed by a larger company, especially if the larger company says it will offer that product someday down the line.

Shepherd: I have a slightly different view of that. Historically, large companies like DEC and IBM have supported a small company with a small product, then somewhere down the line dropped them. IBM bought into and sold out of Rolm [Co.], for example. When I look into the agreements they are now getting into, I wonder how many of these partnerships will be there five years from now.

Many vendors pitch themselves these days as one-stop shops for networking or computer products. How important is that to you?

Cernuto: Wherever possible, if I can concentrate my purchases within one or two vendors, I'll do that. It allows me to negotiate combined discounts, and I get more people on my national account team to service me. That brings in more expertise, and we're more liable to get wind of non-disclosure items than if I had a smaller purchasing history with that company. ▮



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See The FAXNet Form on Page 60

Judge limits trial involving unit

continued from page 11

sign's COM-NET, as well as WCS' CMS-I, CMS-II and TMS-II packages. To date, the judge has limited McCann's access to technical data about the programs.

The judge's decision is a victory for the defendants, freeing them to poke holes in McCann's fraud accusations against MacKinnon without having to worry about countering expert opinions on software comparisons that would have been brought by the McCann legal team.

MacKinnon, who has labeled McCann's accusations as totally false, said McCann was fired for incompetence a few weeks after he began working at Communications Design. He said the software McCann wrote was a disaster.

He said McCann's software was not used as the basis for Communications Design's COM-NET package or subsequent offerings and that McCann was paid for his work before joining Communications Design.

McCann claims he was never paid and is seeking to prove that software marketed today by WCS is based on his telecommunications management program. He claims that users might have to relinquish the software if he wins his case.

MacKinnon's attorney, Bruce Horgan

from the Stamford, Conn.-based law firm Winthrop, Stimson, Putnam and Roberts, said McCann's suit has no basis in fact and claims that WCS guaranteed in its software licensing agreements to protect users from any problems that may stem from the legal dispute. Horgan said the COM-NET program and the current CMS-I are batch processing programs created long after McCann left Communications Design. He said the CMS-II and TMS-II were on-line processing programs developed independently between 1987 and 1989 at enormous expense.

Both sides said there is little chance of a settlement even if McCann proves fraud.

McCann's lawyer, James Murray, said he plans to call a number of witnesses, including former Communications Design employees and possibly early COM-NET users such as Foster Wheeler Energy Corp. to buttress his claims that his software was not scrapped. Horgan said WCS may call a former employee of Warner Communications Corp. who has told WCS that McCann's software failed miserably when tested on a Warner IBM mainframe.

A key witness is expected to be Edward Lennon, a programmer who worked with McCann on the Communications Design software. Both sides said they believe testimony from Lennon will support their arguments. **Z**

People & Positions

continued from page 11

Nate Davis, who was MCI's vice-president of engineering revenue systems development, will replace Maine as senior vice-president of finance.

LeVert, formerly vice-president for large accounts in Washington, D.C., succeeds **Ronald Spears** as president of the Midwest Division in Chicago. Spears recently announced his resignation upon turning down a reassignment within MCI. He will remain with the carrier until the end of the year.

Barent Wagar, formerly director of national accounts, will replace LeVert as vice-president of large accounts.

MCI also announced management reporting changes for its corporate development responsibilities.

The Corporate Development Depart-

ment, which focuses on MCI's acquisition and growth strategy, will be headed by **O. Gene Gabbard**, MCI executive vice-president and chief financial officer. Gabbard previously was chief executive officer of **Telecom*USA, Inc.** prior to MCI's recently completed acquisition of that company.

In changes related to the merger, **C. Thomas Faulders III** was named senior vice-president of a new MCI Enterprise Group. The group consists of four former Telecom*USA units, including telemarketing, voice mail, information services and telecommunications services. Faulders will also be responsible for MCI's International Private Network Services and will work with firms in which MCI holds a minority interest.

Previously, Faulders served as vice-president of national accounts in the Southeast Division. **Z**

Industry Briefs

continued from page 11

Digital Communications Associates, Inc. last week announced it sold its **Digital Transmission Systems, Inc. (DTS)** subsidiary to a group of employees and a venture capital firm that spearheaded the buyout.

DCA declined to disclose the value of the deal, but analysts said the sale of the T-3 equipment maker would have little effect on the company. DCA purchased the privately held DTS for \$12.8 million in 1988.

The DTS sale completes DCA's retreat from the wide-area networking business. In late 1989, the company sold its Network Communications Group, including its Cohesive Networks Corp. T-1 multiplexer unit, to Racal Electronics PLC.

Wang Laboratories, Inc. last week announced it has completed the sale of its InteCom, Inc. private branch exchange subsidiary to Matra Communications.

After marketing Dallas-based InteCom

for more than a year, Wang said last March it would sell the company to Matra for an undisclosed sum of money.

Matra announced that Thomas Mayer, InteCom's president and chief executive officer, will remain in those posts. Jacques Payer, president and chief executive officer of Matra Communications, will take over as chairman of the company.

In a letter addressed to InteCom customers, Payer said, "You have Matra's assurance that we are committed to future IBX and Telari enhancements and developments," referring to InteCom's two primary PBX lines.

Microcom, Inc., a Norwood, Mass., manufacturer of personal computer communications products, last week announced it had acquired the software products of 1stAid Development, Inc. of Boston for an undisclosed sum.

The 1stAid product line of disk recovery products for Apple Computer, Inc. Macintosh microcomputers will be incorporated into the Microcom Software Division product group. **Z**

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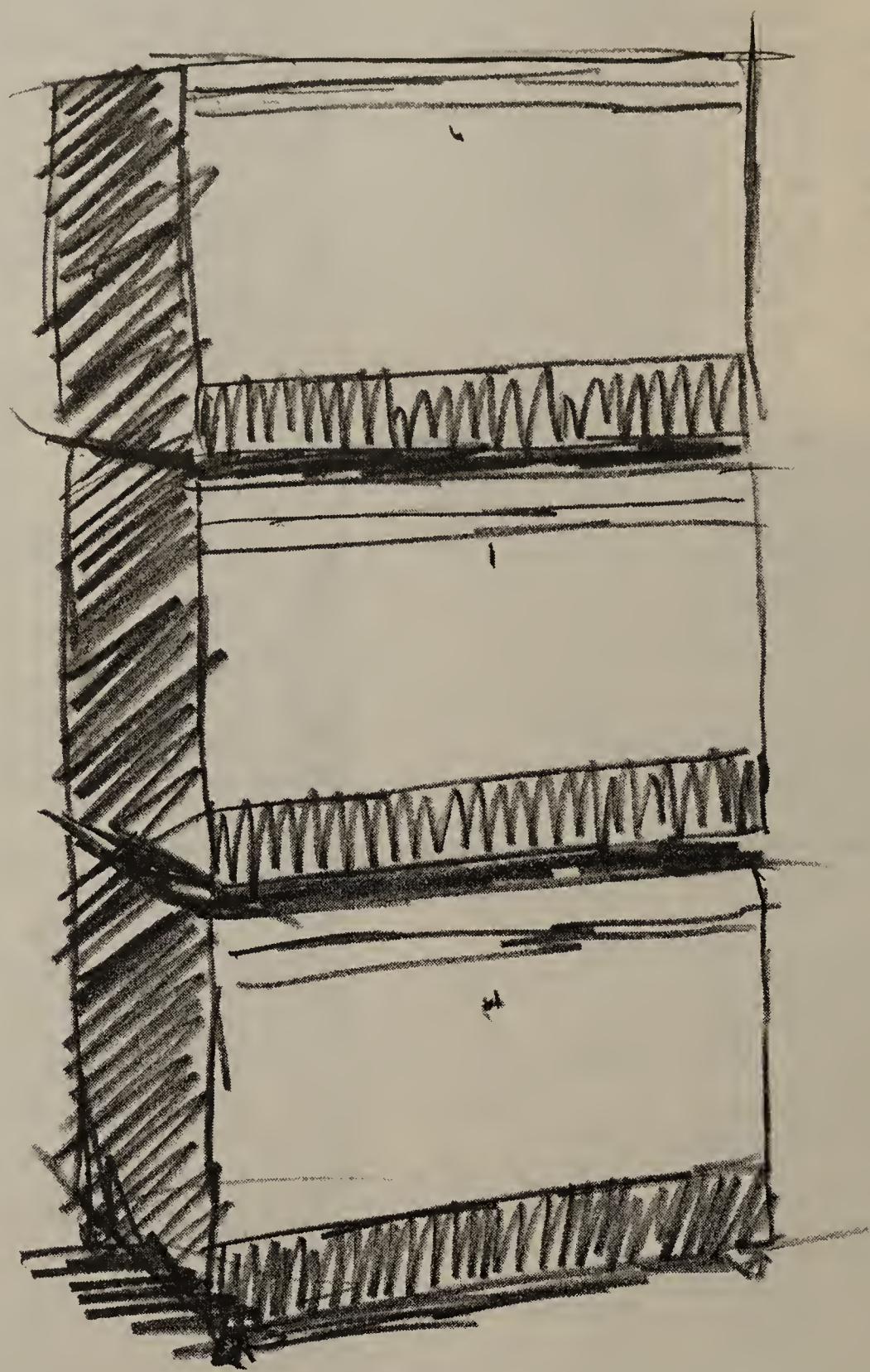


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into the system.*

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over 13,000 experts in
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Design, Sales, Customer



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and performance of
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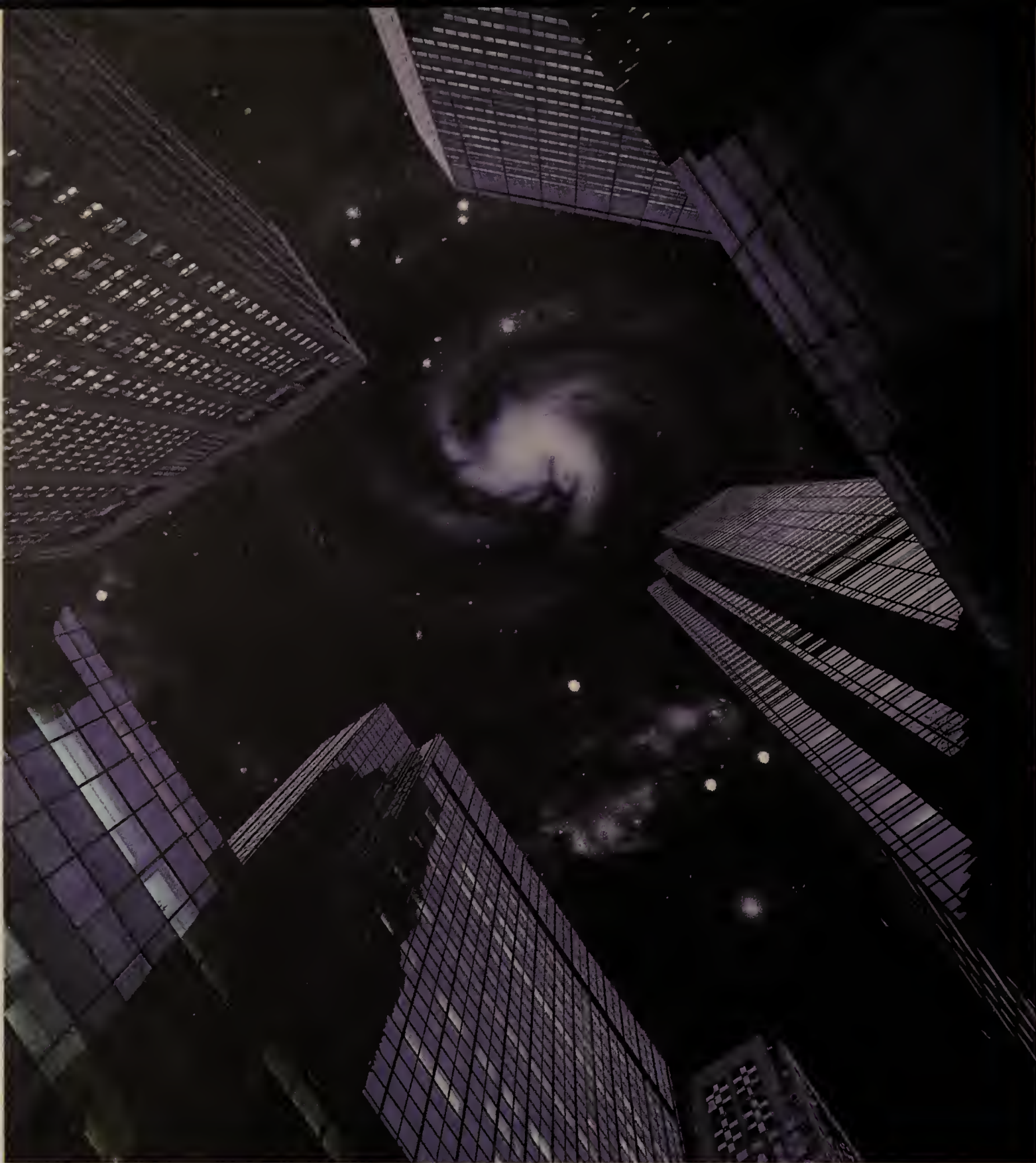


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See The FAXNeT Form on Page 60

TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

Using voice processing systems to automate the handling of operator-assisted calls, AT&T is planning to eliminate 1,000 telephone operators this year, bringing the total force to 19,900. Operators field roughly six million of the 85 million calls AT&T handles each day.

Carrier Watch

National Metropolitan Networks, Inc. (NatMet), an association of alternative access service providers, last week announced completion of a national remote monitoring center in New York.

The center will be used to monitor the quality of local access circuits for customers of NatMet members in 12 cities. All off-hour service calls to NatMet members will be forwarded to the center, which is manned 24 hours a day, seven days a week.

NatMet members include Eastern TeleLogic Corp., Inc. of Philadelphia, Institutional Communications Co. (ICC) of Washington, D.C., Intermedia Communications of Tampa, Fla., and Teleport Communications Group of Staten Island, N.Y.

MCI Communications Corp. last week received delivery of 2.4G bit/sec Synchronous Optical Network (SONET) transmission equipment from Northern Telecom, Inc.

MCI will use Northern Telecom's S/DMS TransportNode in SONET field trials that are scheduled to begin next month between MCI buildings in Richardson, Texas.

SONET defines standards for fiber-optic communications at transmission rates ranging from 45M bit/sec T-3 speeds up to more than 2G bit/sec. □

ANI plays part in Reynolds' aluminum recycling effort

Technology helps callers locate closest center.

By Bob Wallace
Senior Editor

RICHMOND, Va. — Reynolds Aluminum Recycling Co. is using automatic number identification (ANI) to streamline the process of directing customers to the nearest of its 700 recycling centers.

In the past, customers who called looking for the nearest recycling center were given a list of locations that corresponded to their zip code. Agents now use the three-digit prefix contained in ANI to determine the individual center closest to the caller.

Reynolds uses AT&T's American Transtech service bureau to support its dealer locator application. The AT&T subsidiary started using AT&T's Integrated Services Digital Network Primary Rate Interface (PRI) service and its ANI feature with its dealer locator application in 1987.

"ANI made our dealer locator a slick application," said Robert Hawkes, national programs marketing manager for Reynolds. The application makes it more convenient for first-time customers to do business with the firm.

Reynolds averages about seven million transactions annually, in which it pays consumers cash for aluminum cans.

Before ANI, American Transtech agents asked callers for their zip code and entered it into the

system. The customer and the agent waited while the service bureau's AT&T 3B2 minicomputer searched its data base for the list of centers in or near that zip code and transmitted the list to the agent's terminal. Callers then decided which center was closest.

Reynolds frequently updates its dealer locator data base in American Transtech's 3B2 minicomputer, which lists Reynolds recycling centers in 34 states and centers operated by independent companies in other states.

Last year, Reynolds paid its six million customers a total of \$182 million for their aluminum, and the firm recycled 9.7 billion cans.

Today, when customers call Reynolds' dealer locator 800 number, they are routed to an AT&T 4ESS central office switch and over one of the service bureau's five PRI links to an AT&T System 85 private branch exchange at American Transtech's Jacksonville, Fla., headquarters. The AT&T subsidiary receives ANI with at least 70% of the calls sent over the PRI links.

The System 85, configured as an automatic call distributor, passes the ANI data over an X.25 link to an AT&T 3B2 minicomputer running AT&T's ISDN Gateway software, which reformats ANI for an application running on a second 3B2. The second 3B2

(continued on page 18)

Legal history of AT&T's Tariff 15 deals

	Date filed	Discounted service	Rival vendor	Legal status
Holiday Corp.	May 9, 1988	5% to 11% off Pro America	MCI	Rejected as unlawful
Resorts Condominium International, Inc.	Oct. 23, 1989	10% off outbound SDN; 8% off inbound SDN	MCI	FCC lets take effect without ruling on legality
First Commerce Corp.	Dec. 15, 1989	15% off Megacom 800	US Sprint	Withdrawn
CBS, Inc. and Shawmut Bank	March 28, 1990	23% off SDN	MCI	Suspended until Nov. 26; both signed with MCI
La Quinta Motor Inns, Inc.	April 16, 1990	22% off SDN	MCI	Scheduled to take effect June 1
The East Ohio Gas Co., Swift Global Communications, Inc. and Overseas Military Sales Group	May 9, 1990	\$7,500 credit for Megacom, 3-year commitment	MCI and US Sprint	Suspended until Dec. 15
PepsiCo, Inc.	June 15, 1990	15% off SDN, Megacom 800, Basic 800 and 800 Readyline	US Sprint	Deferred until Sept. 13
Original Cookie Co., a division of Midlall, Inc.	June 29, 1990	\$80,000 credit for 2-year term on either SDN or Megacom 800	US Sprint	Deferred until Sept. 18
Schwan's Sales Enterprises, Inc.	July 20, 1990	13% off SDN; 8% off 800 Term Plan, Megacom 800, Basic 800, 800 Readyline; 7% off AT&T World Connect	MCI	Effective Sept. 3
Deluxe Corp.	Aug. 16, 1990	23% off SDN; 13.1% off 800 Term Plan, Megacom 800, Basic 800 and 800 Readyline	MCI	Effective Sept. 30

GRAPHIC BY SUSAN J. CHAMPENY

AT&T plods on with troubled Tariff 15

Company vows to maintain the tariff despite regulatory setbacks, customer service delays.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Despite the legal problems with Tariff 15 that have forced users to wait as long as eight months for service, AT&T is vowing to press forward with the tariff out of competitive necessity.

Joseph Nacchio, vice-president of marketing for AT&T's business communications services, last week acknowledged that users are frustrated by the delays of Tariff 15 deals. But he said the best way to serve customers is to push regulators to give AT&T the freedom to compete effectively.

"What's frustrating to us and to our customers is that we continue to have to go through these very Byzantine [regulatory] processes in order to compete," Nacchio said. "But we are going to keep filing these and keep the pressure up because our customers demand it. What do people want us to do — roll over and not serve customers?"

AT&T contends that in order to retain customers, it must have Tariff 15, which allows it to respond to a rival's off-tariff offer. AT&T's competitors deny that they are offering off-tariff deals.

But Nacchio refutes those

claims. "At any given time, I have on my desk 10 or 15 competitive bids that look like 'off-tariff bids' by my competitor," he said. "We're going to respond to every one."

The Federal Communications Commission is trying to determine whether the Communications Act of 1934 allows carriers to offer off-tariff or discounted services to individual customers. Such deals may violate provisions of the law prohibiting discrimination between customers. The commission has been working on the matter since 1988 but has yet to reach a decision on the legality of single-customer discounts.

Nacchio says he understands that the FCC is trying to do its job but claims the agency is dragging its feet. "We want to give the FCC all the latitude it needs to make this decision, but quite frankly, we're getting a little bit frustrated by their ducking it all the time," Nacchio said.

Users are caught in the middle. They want to take advantage of the lower prices and special deals being hawked by long-distance carriers, but they also risk becoming mired in regulatory quicksand.

According to a source familiar (continued on page 18)

WASHINGTON UPDATE

BY ANITA TAFF

Sikes pledges to promote telecom usage. Federal Communications Commission Chairman Alfred Sikes renewed his commitment to foster widespread availability of advanced telecommunications services to all users, even those in rural areas, in a recent speech to the Organization for the Protection and Advancement of Small Telephone Companies.

Sikes cited several examples in which corporations have successfully located telecommunications-intensive operations in rural areas thanks to cooperation from telephone companies willing to install the necessary communications facilities.

Sikes pointed to such well-known examples as Citicorp's credit card unit in Sioux Falls, S.D., Lands' End, Inc. in Dodgeville, Wis., and Wal-Mart Stores, Inc. in Bentonville, Ark. He also mentioned lesser known examples such as Winnebago Industries, Inc., a leading manufacturer of recreational vehicles headquartered in Forest City, Iowa, and American Home Shield Corp., a major insurance company, located in Carroll, Iowa.

With the appropriate telecommunications facilities, corporations can move out of congested urban areas and save hundreds of thousands of dollars annually. Sikes quoted results of a recent report by the government indicating that traffic congestion in 29 major cities cost \$24 billion last year in productivity losses. □

AT&T plods on with Tariff 15

continued from page 17

with AT&T's offers to PepsiCo, Inc., that firm has decided to switch to a Tariff 12 deal rather than wait to see whether its Tariff 15 offer would be approved by the FCC. Officials at PepsiCo declined to comment.

Nacchio would not say whether

er PepsiCo has abandoned its Tariff 15 plan but said it is possible a user would decide to jump between Tariffs 12 and 15.

Earlier this year, CBS, Inc., for whom AT&T had filed a Tariff 15 offer for discounted Software-Defined Network (SDN) service, opted to buy service from MCI Communications Corp. instead. CBS officials said the decision was prompted in part by fears

about the regulatory process.

AT&T's first Tariff 15, a discounted Pro America deal for Holiday Corp., was rejected as illegal, but the company has already moved to a tariffed SDN service. AT&T also withdrew a plan for First Commerce Corp. amid questions about the deal's legality.

But lured by discounts as high as 23% off AT&T's services, other

customers have chosen to stick it out with Tariff 15.

Out of 10 plans filed with the FCC since 1988, AT&T has been successful in providing service under Tariff 15 to only one customer, Resorts Condominium International, Inc. (RCI). The FCC studied RCI's deal for 90 days, the full period allowed, before taking official action. It then suspended the plan for five more months

while investigating its legality.

FCC rules specify that if the commission does not issue a ruling on the legality of an offer by the end of a five-month suspension, the offer automatically takes effect. Even though RCI is now receiving service, the legal status of the deal is tenuous since it is still under FCC investigation.

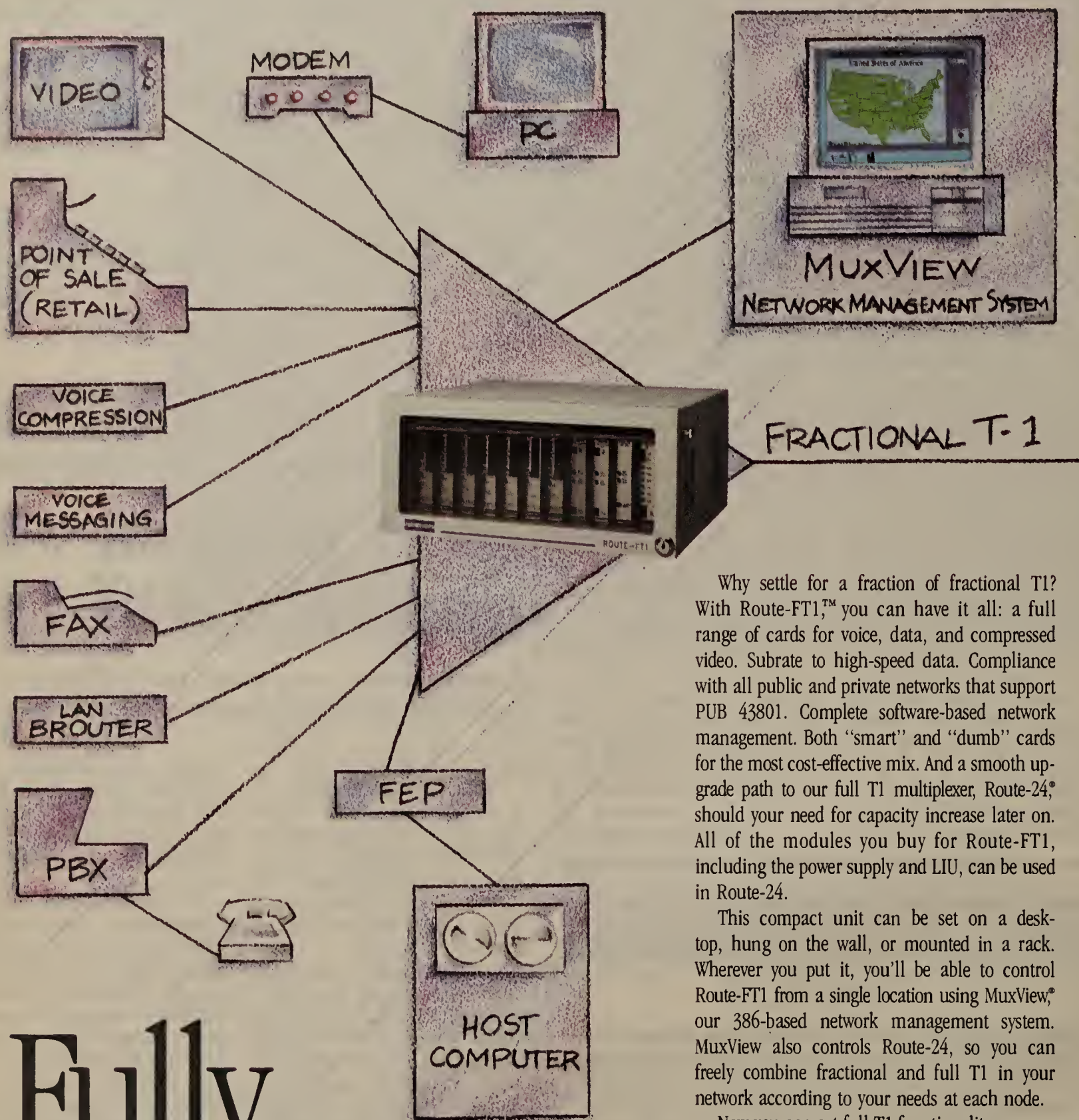
Since then, plans for CBS and La Quinta Motor Inns, Inc., as well as identical deals offered to East Ohio Gas Co., Swift Global Communications, Inc. and Overseas Military Sales Group, have all been suspended for five months. Before the suspensions, the FCC took the full 90 days to review each plan.

The FCC has said it will also take 90 days to review a deal for PepsiCo, and it seems likely that the offer will be suspended like the rest.

Nacchio admitted that some customers have had to face lengthy delays with Tariff 15 plans. "We're caught in this booby trap of statutory [tariff filing] periods on every one of these things."

The majority of Tariff 15 deals have been put on hold for eight months, and AT&T has been unsuccessful twice in its bids to get compensation for these delays. But Nacchio said users that sign up for Tariff 15 plans will not necessarily encounter such problems. "I would not say that if customers have an [off-tariff] offer from one of our competitors, it would take eight months to get [a response] from AT&T," he said. "I would simply say that we have many issues converging, and we hope to get this thing settled in the near term."

Nacchio said AT&T is busy at work on a number of ways to resolve the issue. AT&T filed a complaint with the FCC alleging that MCI is filing off-tariff deals. If the FCC finds in AT&T's favor, MCI might have to pay damages, which AT&T can use to compensate users, he said. **■**



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ANI plays part in recycling

continued from page 17

runs the Edge TeleBusiness System from Coffman Systems, Inc., a Unix-based software package that manages data bases and screen formats.

The System 85 holds each call for one second while Edge retrieves the necessary data from an AT&T Model 3B2/600 minicomputer. The call is then passed to the agent's telephone set while the minicomputer simultaneously transmits the name of the closest center to the agent's terminal.

Reynolds conceived the dealer locator application in the late 1960s. Since American Transtech began operating the application, the number of calls received has increased each year, while the average cost per call has decreased, Hawkes said. **■**

DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

“The network is our only means for delivering our product.”

Kim Small
Director technical studies
System One Corp.
A provider of reservation services
to airlines including Continental
Airlines Corp. and Eastern Air
Lines, Inc.

Data Packets

CrossComm Corp. last week said it will build support for StrataCom, Inc.'s implementation of a frame relay interface into its ILAN routers.

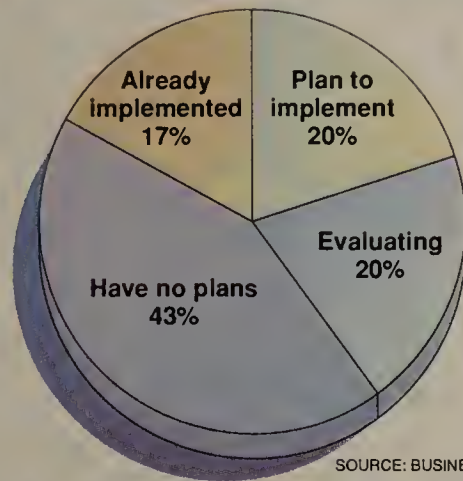
ILAN routers are used to link remote local-area networks. Adding a frame relay interface to the product will enable users to pass LAN traffic through an ILAN to a StrataCom IPX T-1 multiplexer that supports fast packet switching and T-1 transmission between locations.

The StrataCom IPX's frame relay interface and fast packet switching capabilities allocate T-1 bandwidth to transmit bursts of LAN traffic as needed. When the transmission is complete, the bandwidth can be reallocated to other traffic such as terminal-to-host or even voice traffic. StrataCom said its frame relay interface is based on an emerging CCITT standard.

Enable Software, Inc. last week announced a gateway that links its local-area network-based Higgins electronic mail package to Retix's X.400 software. The firm also recently said it is working with Touch Communications, Inc. to build a gateway between Higgins and Touch's X.400 E-mail.

Enable last week announced software that allows messages created by Higgins to communicate with Retix OpenServer 400 software running on the same LAN. OpenServer 400 supports access to X.400-based public E-mail networks, enabling Higgins users to exchange messages with users of any other X.400
(continued on page 23)

Focus on OSI acceptance



A survey of 202 users indicates 17% have installed products that support at least one Open Systems Interconnection protocol, such as X.400. Another 20% plan to install OSI products within the next 12 months.

SOURCE: BUSINESS COMMUNICATIONS GROUP, NEWTON, MASS.
GRAPHIC BY SUSAN J. CHAMPENY

PepsiCo devises order net to help fast-food chains

Net could attract new independent franchisees.

By Jim Brown
Senior Editor

WICHITA, Kan. — PepsiCo Food Systems (PFS) is planning to roll out an automated order entry system that will enable it to accept electronic orders for restaurant supplies from three fast-food chains.

The PepsiCo, Inc. division's electronic order entry system will streamline the ordering process for managers of restaurants owned by PFS' sister divisions — Pizza Hut, Inc., Taco Bell Corp. and Kentucky Fried Chicken Corp. — as well as those owned by independent franchisees.

It will also help PFS compete against independent food service distributors that vie for supply orders from franchisees.

To order supplies with the new system, store managers will fill out an electronic order on a microcomputer at the restaurant. A computer at PFS headquarters here will poll restaurant computers at specified times and upload orders, which will then be passed to PFS' IBM mainframe.

The electronic order entry system replaces a more cumbersome practice of having data entry operators at 3270 terminals linked to the mainframe call each restaurant and key in orders read to them by store managers.

The new system will help reduce phone charges since uploading electronic files takes only a fraction of the time of telephone ordering. It also eliminates order errors caused by data entry operators who key in the wrong information.

“We feel it will be a more efficient ordering process for the restaurant manager as well as for PFS,” said Doug Cothorn, PFS' director of application systems. “We also feel this technology will give us a competitive edge.”

PFS is already building a new version of the electronic order entry system that will feature automated capabilities. With availability scheduled for next year, the package will tap inventory files stored on restaurant microcomputers to determine what items are in stock and examine local sales trends to determine inventory needs and meet projected demand. The application

The system eliminates errors caused by data entry operators who key in the wrong information.

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will then automatically create an order that is uploaded to PFS.

Cothorn said the electronic order entry system currently being rolled out will enable PFS to charge less for supplies by keeping its costs low. The new version will eventually help franchisees free their managers from tedious paper work. “This will help us keep our [administrative] costs low, and it fits in with the direction we see franchisees going in to automate their operations, letting managers spend more time servicing customers rather than doing paper work,” Cothorn said.

The electronic order entry system consists of an in-house application bundled with communications software supplied by Corporate Microsystems, Inc. (CMI) of Lebanon, N.H. PFS and its sister divisions last month signed a contract to acquire the CMI software.

(continued on page 21)

Vendors set to pitch distributed net plans

Distributed computing camps from Sun, OSF to discuss benefits of technologies at INTEROP.

By Jim Brown
Senior Editor

SAN JOSE, Calif. — Users hoping to evaluate the pros and cons of building distributed computing applications have plenty to look forward to at the INTEROP 90 Conference and Exhibition here in October.

Thirteen vendors are planning to demonstrate distributed computing applications based on Sun Microsystems, Inc.'s Open Network Computing and Network File System (ONC/NFS) software at the show.

The Open Software Foundation (OSF) also plans to spread the word about its Distributed Computing Environment (DCE). While it has no demonstration planned, OSF will explain DCE during educational seminars at the exhibition.

DCE is an application development environment based largely on the remote procedure call (RPC) software that is at the heart of the Network Computing System developed by Hewlett-Packard Co.'s Apollo Division, as well as other technologies developed by vendors such as Digital Equipment Corp.

The varying implementations

of distributed computing technology will let end users farm out parts of a compute-intensive task from one computer to another on a net. This will enable, for example, one device to automatically parcel out a task to the network device best suited to process it.

The demonstration was organized to show users that ONC/NFS applications exist.

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At INTEROP, vendors will demonstrate examples of applications that were developed using ONC/NFS. The demonstration was organized to show users that such applications exist, said Barbara Coll, chairwoman of the INTEROP Solutions Showcase committee and a network program manager at Sun.

Coll said the demonstration was conceived when users said
(continued on page 23)

Local gov't installs T-1 net to put crime files on-line

By Paul Desmond
Senior Editor

YAPHANK, N.Y. — New York's Suffolk County is installing a T-1 network and Unisys Corp. computers in an effort to automate operations for law enforcement agencies and save about \$7.5 million annually in clerical costs.

Dubbed the Criminal Justice Information System (CJIS), the network will boast a partially automated 911 dispatching application and will track criminal cases electronically from the time of an arrest through the probation process.

It will eliminate the need to file paper reports, which also must be manually archived for use by other agencies.

The net will be based on Timeplex, Inc.'s Link family of T-1 multiplexers, Unisys A-Series mainframes and mid-range Unisys Unix systems, plus more than 800 intelligent workstations that

will be used to access data on both types of hosts.

CJIS is being installed under a contract with Unisys and Grumman Data Systems, which is acting as the systems integrator. Parts of the network, including the dispatching application, will be operational this year, but the net will not be fully installed until July 1991.

“The goal of the project was to automate the system from start to finish so we would be able to track anything that came to the attention of any agency,” said inspector Philip Robilotto, commanding officer for the communications and records bureau at the Suffolk County Police Department.

A T-1 backbone network based on Timeplex Link/2 multiplexers will link three main sites — police headquarters here, the district attorney's office and the
(continued on page 21)



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Net to help law agencies track cases

continued from page 19

county sheriff's office — located in three different towns within the Long Island county. Smaller sites, such as police precincts, will tie into the backbone using Timeplex microLink multiplexers.

Police officers in the field can phone in reports to a bank of data entry clerks on the network instead of filling out paper reports, which today have to be filed at the originating precinct, photocopied and sent to headquarters.

"I believe we kill about 100,000 trees a week," Robilotto said. The county expects to save \$7.5 million per year by using CJIS to eliminate the need for a bank of clerks at

each of the six precincts as well as employees at other county agencies who handle paperwork, he said.

Message is the medium

The Unisys BNA network will support the computer-aided dispatch system, which includes a partially automated 911 system, along with management applications for police records, jails, district attorney cases and stolen property.

When a 911 call comes in, an operator will key caller information into the system and electronically message a dispatcher to radio a police officer in the area to respond to the call. That will replace a manual system whereby operators passed written instructions to dispatchers.

Once in the system, the message is

The county expects to save \$7.5 million per year by using CJIS to eliminate the need for a bank of clerks at each of the six precincts as well as employees at other county agencies who handle paperwork, according to Suffolk County's Philip Robilotto.

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stored on an A-Series mainframe and can be accessed by various county law enforcement and judicial agencies throughout the duration of the case. Instead of photocopying paper forms for the district attorney's office, court officials and probation departments, a copy of the file can be routed electronically via the BNA network.

Besides the BNA net, 15 Unix computers will support office automation applications for the district attorney's office. Eight of those systems will be located in Hauppauge, N.Y., and the other seven will be in Riverhead, N.Y. Each will be attached to an Ethernet local-area network supporting intelligent workstations that can also access the BNA network. A channel on the T-1 backbone will support Ethernet bridging between the two sites. ■

PepsiCo devises net for fast-food chains

continued from page 19

PFS will supply each sister division and franchisee with a microcomputer-based inventory order application. PFS will also outfit franchisees with a copy of CMI's microcomputer-based MLink communications software. Sister divisions will supply their own CMI software.

MLink will work with CMI's Polling Manager software running on an IBM Personal System/2 Model 70 supporting OS/2 here. PFS uses that PS/2 to establish an asynchronous 2,400 bit/sec dial-up link with each franchisee's restaurant at a specified time to upload orders. The Model 70 uses CMI's 3270 terminal-emulation software to feed that data to an IBM 3090 that PFS shares with Pizza Hut, which has its headquarters in the same building.

Each division will use its own microcomputer and CMI software to upload daily sales data, payroll information and elec-

The application is being tested by 10 franchisees.

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tronic orders from microcomputers in its restaurants over 2,400 bit/sec dial-up links. Each division also has its own IBM host that will receive the data from CMI 3270 terminal-emulation software. Each host puts orders from all the restaurants it serves in a batch file that is transmitted over PepsiCo's Systems Network Architecture backbone net to PFS' host.

Once an order is processed by the PFS host, its PS/2 calls back each restaurant to download an order confirmation. Each division receives confirmation over PepsiCo's backbone net and downloads them along with price changes, menu additions and payroll revisions to its own restaurants.

The application is being tested by 10 franchisees and each of PFS' sister divisions. Cothorn expects all sister division restaurants will be using the order entry system by mid-1992. Franchisees will be added as they request the service.

The divisions are eager to expand use of the order entry system. "We're excited about the possibility of entering orders electronically," said Butch Dulaney, Kentucky Fried Chicken's director of restaurant systems development. ■



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 **General DataComm**

Vendors set to pitch net plans

continued from page 19

they found it difficult to find examples of distributed computing applications built using ONC/NFS, which utilizes a different RPC than DCE. An RPC is a key element of any distributed computing technology since it enables an application running on one computer to instruct other computers on the network to perform tasks on its behalf.

"We're currently at the stage of looking at five or six different applications that will run on six or seven different platforms," Coll said.

Simple to complex

For example, one application supports a distributed spell-checking function. In this application, word processing software running on disparate devices on the network uses the RPC built into ONC/NFS to transparently check the spelling of words in a dictionary stored on another network device.

A relatively more complex application supports the processing of atmospheric research data. In this application, real-time data is fed to a single device on the network from a satellite. That device parcels out the data to other computers on the net that work together to analyze weather patterns and build weather models.

The spell-checking application will demonstrate how distributed computing can enable applications running on different devices to make a task performed on another device appear as though it were performed locally. The weather application will prove how the technology lets disparate computers on a network simultaneously work on different pieces of one application.

OSF is planning action of its own. In addition to hosting technical seminars to explain DCE, OSF is hoping some of its member firms will demonstrate applications based on an early version of

DCE released last month.

OSF simply did not have enough time to organize a more formal demonstration, said Doug Hartman, OSF director of request for technology engineering.

"The timing wasn't quite right for us to do that," Hartman said. "INTEROP is probably a little early for us in terms of a lot of demonstrations. But we're talking to a lot of the people that supplied

basic technology to us. And they are probably going to be interested in demonstrating the current version of their own technology and early work done with DCE."

Hartman said OSF has been too busy assembling the various technologies to comprise the software. He said OSF has finished licensing DCE technology from the firms that developed it and is now enlisting vendors to

support DCE. So far, 25 different vendors including DEC, HP and IBM have committed to supporting DCE.

OSF reached a major DCE milestone by shipping an early version of the software, called a DCE Snapshot, to select members last month. A more advanced DCE Snapshot version is expected to ship in October. The current software has limited functional-

ity, but it allows software developers to get some experience.

OSF is now building a DCE developer's tool kit it plans to ship by year end. That tool kit will include the RPC software and other programming tools needed to help vendors start getting experience in building distributed computing applications using DCE. A full developer's tool kit is scheduled to ship by next spring. Z

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Data Packets

continued from page 19

E-mail package.

The software is called Higgins X.400 Gateway and was developed by **ProtoComm, Inc.** of Trevoze, Pa. The Higgins X.400 Gateway costs \$4,490 and is available now from ProtoComm.

Enable also said it signed a contract with Touch for development of a link between Higgins and Touch's Worldtalk 400 Gateway Server. Touch will develop the software, but both firms will sell it to users.

The link between Higgins and Worldtalk 400 Gateway Server will let users of Higgins exchange messages with users of any other X.400 E-mail system. It will be available in the first quarter of 1991. Z

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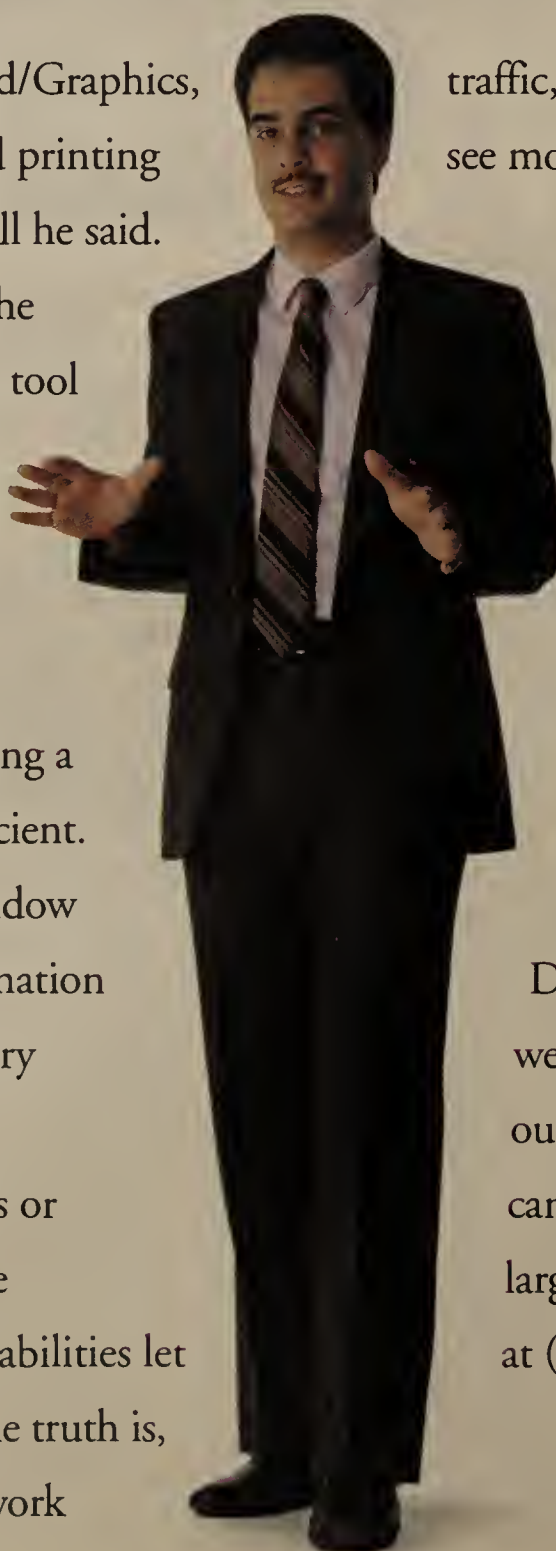
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LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

“We’re getting 30 reports a week of Jerusalem virus infections on Novell, Inc. NetWare LANs. One simple precaution users can take is to write-protect the files to a read-only area on the server, and that will prevent the virus from infecting the server.”

John McAfee
Chairman
Computer Virus
Industry Association
Santa Clara, Calif.

Netnotes

Cisco Systems, Inc. last week said its internetwork routers were being enhanced to support Banyan Systems, Inc.’s VINES network operating system.

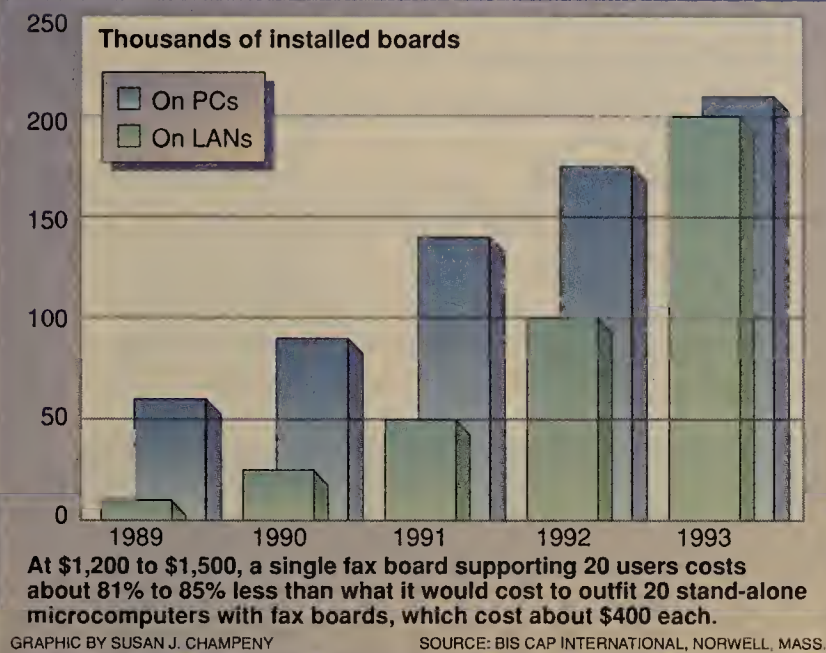
Available in November, this upgrade will implement Banyan’s VINES Internet Protocol and routing algorithm, thus enabling VINES servers and Cisco Systems routers to share information. Among other things, this will give VINES users access to Fiber Distributed Data Interface backbones and T-1 links via the routers.

The enhancements let Cisco Systems’ NetCentral Station, based on the Simple Network Management Protocol (SNMP), manage Cisco Systems routers located on VINES networks. Cisco Systems’ VINES implementation includes support of Banyan’s StreetTalk global naming service, which provides a single distributed name data base for all users and shared resources on an enterprise net.

The VINES enhancements will be included in all new Cisco Systems routers as of this November and will also be available as a field upgrade to existing routers.

Cisco Systems can be reached by writing to 1525 O’Brien Drive, Menlo Park, Calif. 94025, or by calling (415) 326-1941. ☐

Fax boards find new homes in LAN servers



Tri-Data to give its routers IPX, FDDI, TCP/IP support

MaxWay 500 enhancements will be phased in.

By Susan Breidenbach
West Coast Bureau Chief

SANTA CLARA, Calif. — Macintosh-to-mainframe specialist Tri-Data Systems, Inc. has announced plans to enhance its MaxWay 500 family of routers to support Novell, Inc.’s Internetwork Packet Exchange (IPX), TCP/IP protocols, Fiber Distributed Data Interface networks and wide-area links.

When all the new features have been incorporated, the MaxWay 500 gateways will be able to route IPX, Transmission Control Protocol/Internet Protocol and AppleTalk packets simultaneously across enterprisewide nets that include LocalTalk, Ethernet, token-ring and FDDI segments, as well as wide-area connections operating at up to 64K bit/sec.

The enhancements are being phased in, with IPX support scheduled to be available by year end, followed by TCP/IP and wide-area network routing in the first quarter of 1991, and FDDI support later next year.

Tri-Data also announced price cuts for its MaxWay 500 routers and NetWay 2000 gateways. The vendor introduced an FDDI adapter for these lines as well.

The basic MaxWay 500 router comes with four LocalTalk ports and either an Ethernet or a token-ring interface. It has an expansion slot for another Ethernet or token-ring interface and will support a mixture of the two so that a single gateway can route packets among all three network types.

The MaxWay 500 is now priced at \$5,495, down from \$7,495. Additional Ethernet and token-ring (4M or 16/4M bit/sec) adapters for the gateway are

available for \$1,995 each.

The NetWay 2000 Systems Network Architecture gateways, which include the gateway box and 3270 client software, come in 16-, 32- and 128-session versions that now range in price from \$4,995 to \$14,995.

The price of the NetWay 2000 gateways can be further reduced by taking advantage of a new trade-in program that will give users of its earlier generation NetWay 1000 gateways credit toward the purchase of a NetWay 2000. This credit amounts to \$500 for a 16-session NetWay 2000 and \$1,000 for all other versions. The offer will be available until year end.

NetWay 2000 client software is available for Macintoshes and DOS-based personal computers, including those running under Microsoft Corp.’s Microsoft Windows 3.0. A single gateway will support both Macintosh and DOS workstations.

Each NetWay 2000 can simultaneously support multiple gateway-to-mainframe token-ring and Synchronous Data Link Control connections. Clients can be linked to the gateway via LocalTalk, token-ring or Ethernet local-area networks using AppleTalk or IPX protocols.

All of the MaxWay 500 routers and NetWay 2000 gateways have a VMEbus expansion bus and incorporate a Reduced Instruction Set Computer chip that can process 10 million instructions per second and is based on Sun Microsystems, Inc.’s Scalable Processor Architecture design.

Tri-Data is located at 3270 Scott Blvd., Santa Clara, Calif. 95054; (408) 727-3270. ☐

Ethernet diagnostics tool offers graphics

New net mgmt. product from Silicon Graphics lets users monitor Ethernets from one location.

By Laura DiDio
Senior Editor

MOUNTAIN VIEW, Calif. — Silicon Graphics, Inc. recently introduced its NetVisualizer, a graphics-based network management and diagnostic product that enables users to monitor Ethernet networks from a central site.

The NetVisualizer consists of two components: Data Station and Display Station software.

The Display Station software runs on a network administrator’s central monitoring station, a Silicon Graphics Iris 4D/25S graphics server. It runs under IRIX, Silicon Graphics’ version of the Unix operating system.

The second component, Data Station software, runs on a Silicon Graphics workstation on each Ethernet subnetwork.

The Data Station transmits real-time traffic information regarding subnet activity to the network administrator’s Display Station.

The Display Station thus enables network administrators to troubleshoot an entire enterprisewide network — including remote Ethernet subnets — and locate, isolate and disable faulty nodes.

If the Data Station is located on a geographically remote subnet, the information is sent to the Display Station using existing internetwork links between the Ethernets such as a serial link, T-1 line, X.25 wide-area net or microwave link.

According to Robert Clark, vice-president of sales and marketing, NetVisualizer provides network administrators with an integrated set of graphical and diagnostic tools that show network activity.

This includes configuration and traffic statistics regarding the status of individual network nodes, peripherals, bridges, routers and gateways that are attached to the corporate enterprise network, Clark said.

The NetVisualizer incorporates five monitoring and diagnostic tools. They include NetLook, which details network configuration and traffic patterns between host systems, as well as security violations and locations of gateway bottlenecks; NetGraph, which provides statistical bar chart summaries of packet transmissions such as bit/sec or packet/sec; Analyzer, which

(continued on page 26)

Defense Dept. contractor moves into micro market

By Susan Breidenbach
West Coast Bureau Chief

SAN DIEGO — Defense contractor Horizons Technology, Inc. recently moved into the commercial microcomputer software market with the announcement of two products that help network administrators and users manage workstation resources and documents on local-area networks running Novell, Inc.’s NetWare.

LAN Auditor automatically polls all workstations on a LAN to determine their various configurations and attached resources. Power!Search locates documents on a LAN by doing full text searches across all network drives, employing “fuzzy” search algorithms that do not require exact matches.

Available in September, both products are a commercialization of technology that Horizons developed during its 13 years as a Department of Defense contrac-

tor. The Power!Search algorithms, for example, are an outgrowth of techniques the company employed in its work on towed-array sonar.

“Unlike a lot of [Defense Department] companies, we focused on PCs and microcomputer technology,” said Phil Morettini, product marketing manager for Horizons. Consequently, Horizons is finding growing demand for its services from the Defense Department and from the commercial microcomputer market.

LAN Auditor is a DOS application that runs on Intel Corp. 80286- or 80386-based personal computers. It inventories each workstation and server on the NetWare network and creates a data base that is updated each time LAN Auditor is run.

The information that can be collected about each machine includes CPU type; DOS and Basic

(continued on page 26)

Ethernet diagnostics tool offers graphics

continued from page 25

gives diagnostic information and a detailed analysis of packet protocols and data; RouteQuery, which queries the routing tables of any host on the corporate net; and TraceRoute, which traces the routes of all data packets across the network.

Because NetVisualizer displays all network activity in English-based text and graphics, it reduces the complexity of network management and the time it takes for the administrators to identify and locate problems, Clark claimed.

The graphical map of the network also helps network administrators reduce downtime by enabling them to identify

problems and their physical locations within minutes, he said.

"Whereas before, it might have taken hours or days to locate and identify the

problem almost instantly," Clark said.

Jim McCabe, project leader for network development at the National Aeronautics and Space Administration Ames Research

The graphical map of the network helps net administrators identify problems and their physical locations within minutes.

▲▲▲

source of a problem such as a broken connection, traffic bottleneck, faulty node or broadcast storm, NetVisualizer lets the network administrator pinpoint the prob-

Center in Moffett Field, Calif., a beta-test site for NetVisualizer, said, "This is by far the easiest-to-use graphics-based network management I've ever worked with."

NASA Ames Research has been using the NetVisualizer to monitor and manage more than a dozen Ethernet and SynOptics Communications, Inc. LattisNet nets connected to the center's Ethernet backbone.

"The graphics give the network administrator instant access to what's wrong with the network and where the problem resides," McCabe said. "It saves us time and a lot of headaches."

Additionally, NetVisualizer is capable of simultaneously monitoring and decoding a range of protocols, including Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s DECnet, Novell, Inc.'s NetWare, Apple Computer, Inc.'s AppleTalk, Microsoft Corp.'s OS/2 LAN Manager, Xerox Corp.'s Xerox Network Systems and Open Systems Interconnection protocols.

The NetVisualizer also supports the Simple Network Management Protocol standard for net management.

NetVisualizer is available now. The NetVisualizer Display Station software costs \$8,000, and the Data Station software sells for \$4,000.

Users can also purchase the NetVisualizer software bundled on Silicon Graphics Iris workstations and servers.

A minimum system configuration for the network administrator's NetVisualizer Display Station sells for \$28,590 and includes an Iris 4D/25 workstation, 200M-byte disk drive, tape drive, Ethernet transceiver, cable and software.

A NetVisualizer Data Station sells for \$12,490 and includes an Iris 4D/25S server with a 200M-byte hard disk drive, Ethernet transceiver and cable. ■

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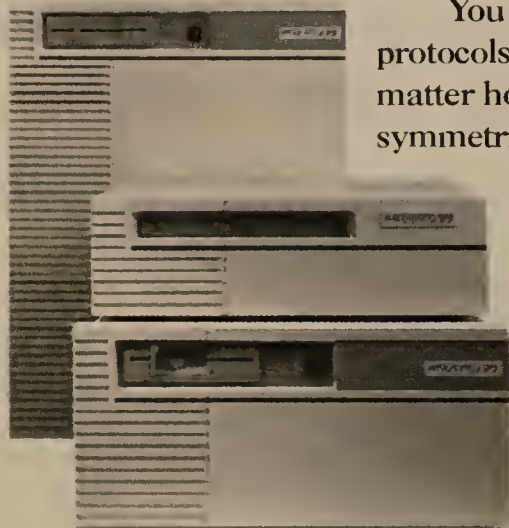
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Defense contractor moves into micros

continued from page 25

I/O System versions; amount and type of random-access memory; number and capacity of floppy disk drives; and hard-disk capacity and amount of storage available.

Network-specific information that is gathered by LAN Auditor about each computer includes the network physical interface address, LAN adapter configuration and the NetWare shell version.

An optional feature prompts users for a property tag number, room number or location when they log on. LAN Auditor can use this information to instruct the administrator where to go when a visit to a particular user is indicated. Property tag information can be used to perform a physical inventory of network equipment.

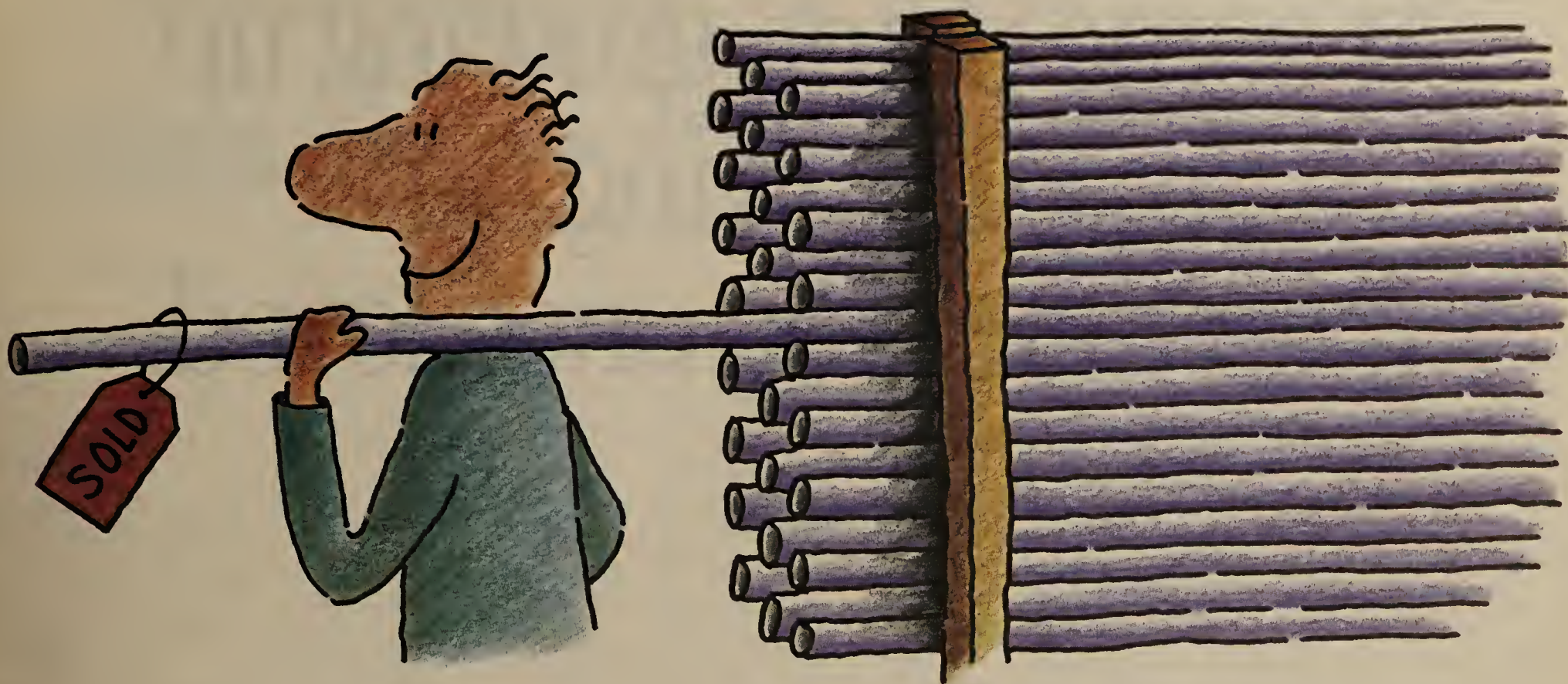
A base LAN Auditor package, which can track as many as 50 users, is priced at \$495. It can be expanded in 100-user increments at \$295 per increment.

The new Power!Search product can circumvent a LAN's server disks, conducting full text searches through word processing, spreadsheet and data base files located on those disks. The data to be searched does not have to be indexed, converted to ASCII or otherwise preprocessed.

Spelling errors or alternative spellings are accommodated by Power!Search's fuzzy algorithms, which can look for approximate as well as exact matches. The fuzziness can be set at various levels, from 100% (exact match) to 70%, as needed.

Power!Search is priced at \$595 for a six-user LAN package, while an unlimited-user version costs \$995 per server.

For more information, contact Horizon Technology at 3990 Ruffin Road, San Diego, Calif. 92123; (619) 292-8320. ■



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MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USERS GROUPS AND ASSOCIATIONS

Worth Noting

“**O**utourcing eliminates a lot of overhead that most people don’t realize goes into running and staffing an IS operation. Things such as checking expense reports, dealing with end-user problems, recruiting new workers and managing personnel problems really eat into productive time.”

Walter Hoehler
President
Hoehler & Associates, Inc.
Warren, N.J.

Reservation net operators seeking new opportunities

Firms weigh plans to offer nontravel net services.

By Paul Desmond
Senior Editor

ROSEMONT, Ill. — Operators of U.S. airline computer reservation networks, which for years have generated enormous revenue from travel-related services, are planning to spread their wings to serve other industries.

Representatives of some of the largest U.S. reservation network operators say their companies are exploring ways to use existing facilities to provide a variety of network-based services to companies outside the travel industry.

One of the companies, Covia, which operates the Apollo computer reservation network, said it may announce as early as next year new services provided over Apollo for customers in a number of industries.

“I think some exciting opportunities exist in a range of industries,” said William Smith, Covia’s director of strategic planning. “We are aggressively looking at a number of them.”

Smith said Covia will likely offer a range of services, from network transport to transaction processing and systems integration.

“The more things that you can bring in that meet a series of discrete needs for a client, the better off you’re going to be,” he explained.

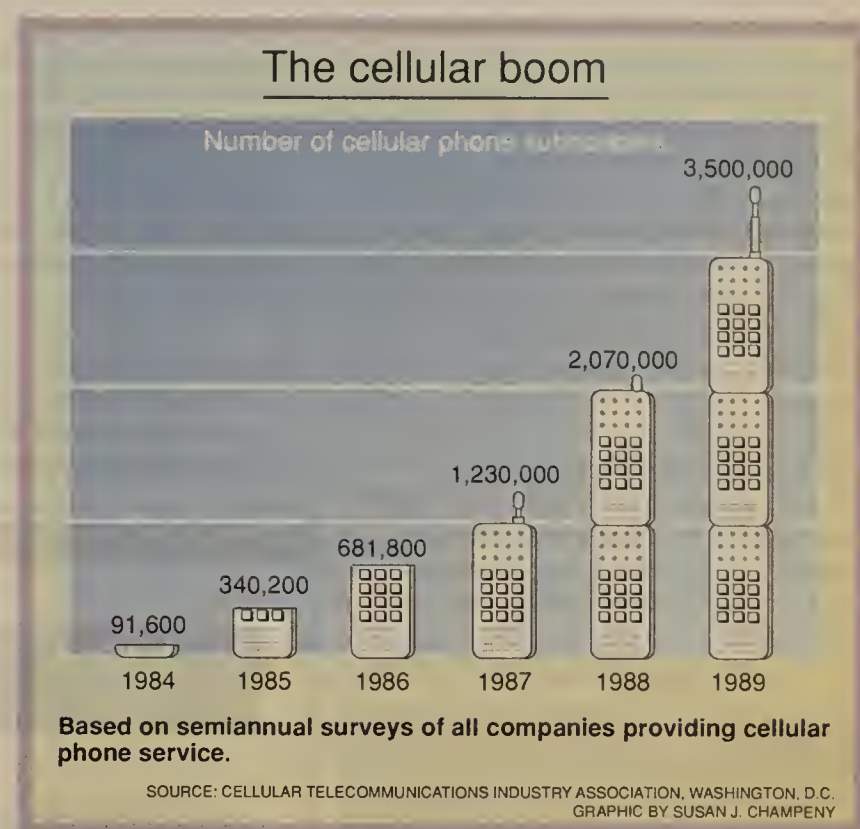
Essentially, Smith said, computer reservation nets are used to aid buyers and sellers in consummating a transaction. Thus, the networks could easily serve retail and financial companies, among others.

“If you thought of a telemarketing center as being something like a reservation center, you would see the analogy there,” Smith said.

The challenge lies in finding the right match in terms of a market niche and in timing. “We in the [computer reservation system] business could have possibly done something interesting in securities if we’d started on it five years ago,” but the field is too crowded today, he said.

Among the opportunities that could still be pursued in the financial arena is, for example, a value-added network service for large retailers of mutual funds.

Smith said his company still sees enormous possibilities for growth within the travel industry
(continued on page 31)



Network groups take control of cellular

Users centralize purchasing, weave cellular and other new technologies into network strategies.

By Bob Brown
Senior Editor

Network managers at many companies are taking control over cellular and other forms of mobile communications, making these rapidly evolving communications technologies a key component of their strategic network plans.

To date, cellular communications purchases were primarily handled by individual departments or employees. But a growing number of companies are realizing the advantages of centralized control over cellular spending and usage.

Network managers say central control enables them to coordinate equipment and service purchasing to leverage volume discounts, better integrate cellular communications with existing corporate network infrastructures and explore ways to take advantage of new wireless communications tools.

Network executives are looking at new applications for cellular technologies, including applications that improve customer service and network support for field teams, as well as aid in disaster recovery.

“Our office of the future may not have four walls, but four wheels instead,” said Dick Bradner, manager of network services at Progressive Casualty Insurance Co. in Cleveland. “We are looking at cellular technology not so much to replace what we have, but to augment it.”

Advances in wireless commu-

nications are spurring interest on the part of communications managers.

“New methods of wireless communications are being introduced all of the time, and the usefulness of these means of communications can’t be overlooked by network managers,” said Stephen Saks, chief information officer for the California Trucking Association. The West Sacramento, Calif.-based organization plans in the near future to sign a

“**N**ew methods of wireless communications are being introduced all of the time,” Saks said.

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long-term agreement for cellular communications services for its members, but Saks declined to provide details of the agreement.

“Network managers that fail to pay attention to cellular communications will find their companies falling behind the competition,” he said.

Particularly in industries such as transportation, where employees spend a lot of time on the road, cellular communications is a way to improve operating efficiencies and customer service, Saks said.

(continued on page 30)

Association Watch

The newly formed **Houston 30** group is sponsoring a Users’ Forum Sept. 11 to 13 in Warren, Mich. The meeting is designed to give network and IS managers an opportunity to present their opinions about ways to accelerate the development and implementation of open systems.

The meeting will feature update reports from the previous two meetings of this fledgling open systems group. In addition, workshops are scheduled in which members will define an organizational framework for the group and discuss problems slowing the development and implementation of open systems.

The group is composed of about 85 network and computer managers at large companies and has already met twice to discuss ways to accelerate the deployment of open systems.

Currently, the group has defined nine barriers to open systems development. These include the inability of users to articulate open systems requirements to vendors, as well as the high level of investment in installed proprietary systems. To register for the meeting, call (313) 769-4454. ■

EXECUTIVE BRIEFS

BY WAYNE ECKERSON

See ya later, alligator. The average job tenure of chief information officers (CIO) has fallen to an all-time low of 2½ years, down from three years in the mid-1980s, according to John J. Davis & Associates, an executive search firm in New York.

According to the firm, the five reasons most frequently cited by top management for discharging a CIO are:

- The CIO was an empire builder who wanted complete control over the use of technology at the company — despite attempts by end users to gain greater access to technology.
- The CIO was inflexible and failed to offer a variety of solutions. The CIO continually fought about reporting lines, budgets, investments and personnel.
- The CIO failed to streamline operations. For example, the CIO avoided hiring subcontractors for special projects as a way to reduce staffing and technology requirements.
- The CIO was out of touch with the company’s business goals.
- The CIO failed to attain stated goals or objectives for information technology at the company.

Death knell for job security. The highly competitive business environment of the 1980s and ’90s has eroded job security at a majority of companies, according to a new survey by The Conference Board, an international nonprofit management research group in New York.

As a result, many companies are beginning to offer career development programs and other benefits to engender em-

(continued on page 30)

Network groups take control of cellular

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"Cellular, combined with paging, can make for a very effective network setup for having instantaneous access to truckers on the road," Saks said.

Many of the California Trucking Association's 2,500 members already use mobile communications technologies, such as two-way radio, that can be more geographically limited than cellular, Saks said. With prices for cellular phones and service falling, cellular communications could become more affordable than two-way radio or other means of communications, he added.

Rising expenditures

One important factor driving the shift in control over cellular communications is rapidly rising cellular expenditures. Overall sales of cellular equipment and service are expected to grow from \$4 million today to \$16 million at the end of the century, according to International Resource Development, Inc., a New Canaan, Conn.-based market research firm.

Sales to small and midsize businesses have driven the cellular market to date, but that is changing, said Steve Von Bevern, director of corporate marketing at PacTel

in and started dealing directly with PacTel Cellular."

Sunkist's packaging inspectors, who need to report findings back to the office in a hurry, are among the cooperative's cellular users, Faulken said.

Network managers at companies in a range of industries, from insurance to agriculture, are finding cellular and other forms of mobile communications hard to ignore.

A nice surprise

One telecommunications manager who requested anonymity said, "Cellular has kind of crept up and caught network man-

agers by surprise, sort of like fax machines and LANs."

This telecommunications manager is conducting a study aimed at developing a corporate cellular communications strategy. The company may eventually enable cellular users to direct long-distance calls into the corporate virtual private network in order to save money.

Currently, cellular calls are often routed to carriers other than the company's primary carrier.

Vince Montecalvo, telecommunications manager for Nike, Inc. in Beaverton, Ore., said cellular services will play a key role in his company's disaster recovery strategy.

"When a central office goes down, cellular communications may be our best bet for keeping in touch," he said. ■

Executive Briefs

continued from page 29

ployee loyalty and attract new recruits. The report titled "Rethinking Employment Security" was based on interviews with executives at 216 major U.S. manufacturing and service firms.

Flattened management hierarchies have left little room for advancement within companies, the report said. This has forced firms to offer job enrichment and retraining programs as a means to attract and keep skilled workers, according to Kay Troy, author of the report.

How honest are you? The greatest threat to network and computer security often comes not from villainous outsid-

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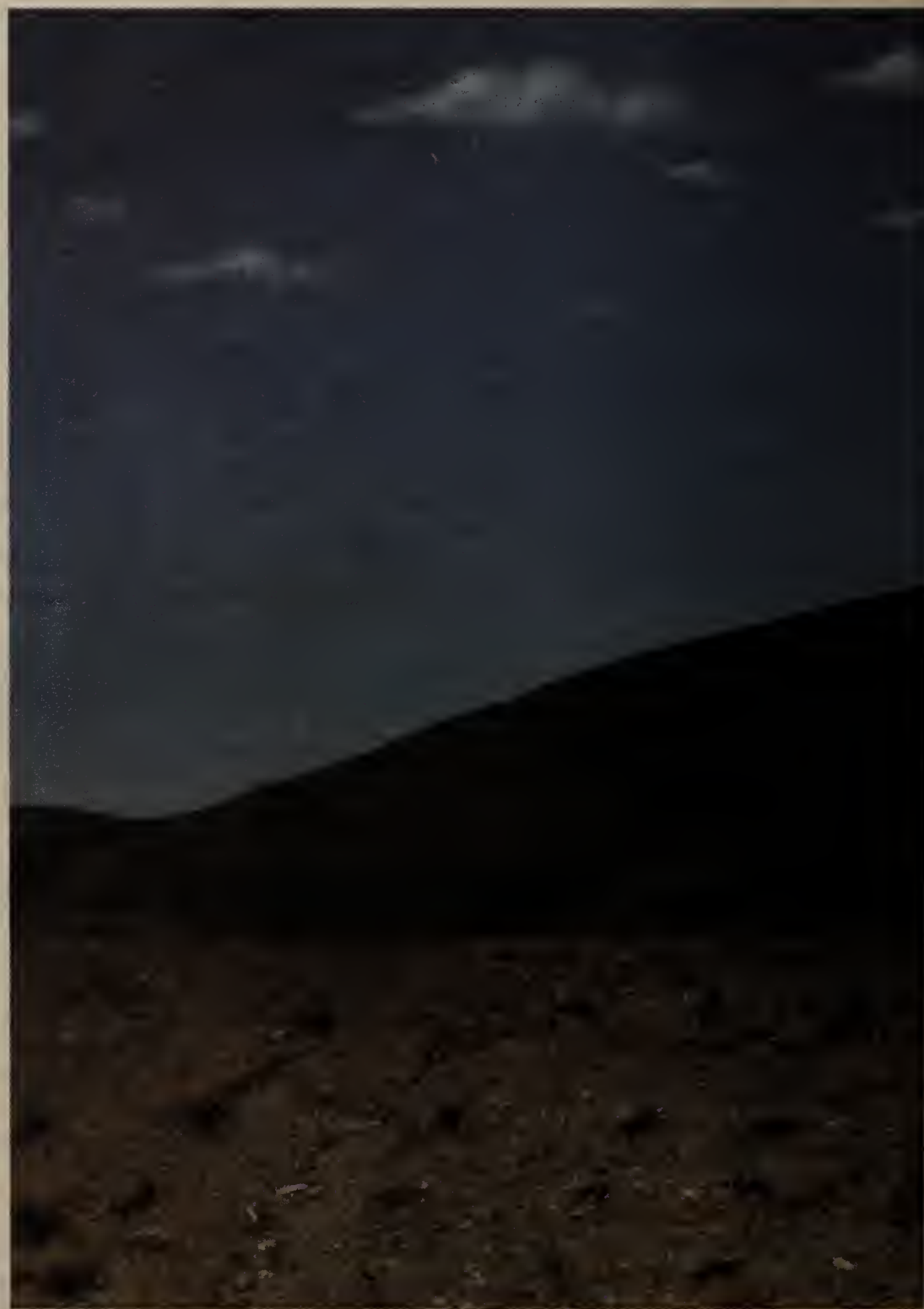
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“Cellular companies are going through a transition with their marketing processes. They used to sell ‘onesies’ and ‘twosies,’ but now it’s more like 100 phones at a time.”

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Cellular, a Pacific Telesis Group company based in Newport Beach, Calif. He said major account sales are picking up steam.

"The national account program has had a slow acceptance, but now it's starting to catch on like wildfire," he said.

"Cellular companies are going through a transition with their marketing processes," said Clifford Bean, director of the mobile telecommunications consulting practice at Arthur D. Little, Inc., a Cambridge, Mass.-based consulting firm. "They used to sell 'onesies' and 'twosies,' but now it's more like 100 phones at a time. That's because instead of just going after a sales office or an individual, cellular firms are focusing on the network manager."

Von Bevern acknowledges, however, that national account sales are hampered by the lack of a nationwide cellular network.

Herschel Shosteck, president of Herschel Shosteck Associates, Ltd., a Silver Spring, Md.-based cellular market research firm, warned that cellular companies "have a big education process in front of them" in their efforts to inform network managers about mobile communications. "But the effort should pay off," he adds.

Gene Faulken, telecommunications operations manager at Sunkist Growers, Inc., a Sherman Oaks, Calif.-based farm cooperative that markets citrus fruits, said, "Cellular started off modestly at our company, and we were dealing with multiple small agents. But when it started to take off, our telecommunications department stepped

ers but from unscrupulous employees.

Companies that would like to check the honesty and integrity of job candidates can administer a simple questionnaire from P.O.S. Corp.

P.O.S. evaluates the results of the Pre-employment Opinion Survey, which consists of 40 true/false questions, to determine the honesty of potential employees and the degree of risk each poses to the company. Job applicants are placed in one of five risk categories: serious, poor, average, good and excellent. Currently, about 800 large and small companies are using the P.O.S. survey, including major utilities, banks and retail chains, according to a P.O.S. spokeswoman.

The P.O.S. Survey, which takes about 10 minutes to fill out, is administered to can-

didates after all other hiring guidelines are met. Companies can call P.O.S. with a candidate's responses and get an immediate measure of the person's risk level, or they can mail the completed questionnaire to P.O.S. Ten questionnaires cost \$125, 25 cost \$287.50 and 100 cost \$1,000. For more information, call (800) 621-4008.

Stress stretching. Joan Borysenko, former director of the Mind/Body Clinic at New England Deaconess Hospital, said she recommends a simple set of "Anytime Exercises" that can help desk-bound professionals relieve stress without leaving their seats.

One exercise Borysenko recommends is intended to relax tense back muscles. Sitting comfortably on the edge of your

chair, place your feet flat on the floor and your hands gently on your knees. Close your eyes and slowly inhale. Arch your shoulders and head backward while stretching your spine as far as is comfortable. While exhaling, curl your shoulders forward to ease any tension. Repeat this procedure three times.

Borysenko also recommends a simple facial exercise. With your eyes closed, inhale and scrunch your facial muscles together, including lips, nose, eyes and forehead. Relax these muscles as you exhale. Then with your eyes closed, open your mouth wide into a yawn as you inhale. Exhale again, relaxing all your muscles. **Z**

The last brief was contributed by Rick Margolis, a free-lance writer.

Operators seeking new opportunities

continued from page 29

in areas such as car rental, and hotel and cruise reservations. But the company recognizes that expertise developed in the transportation industry could be applied profitably elsewhere.

A spokeswoman for System One Corp. — which runs the reservation network used by Continental Airlines, Eastern Airlines and the Trump Shuttle — acknowledged that the company plans to offer non-travel services using its network but declined to comment on the specifics of its plans.

Likewise, a spokesman for the recently formed Worldspan Travel Agency Information Services said his company plans to explore new market opportunities that leverage its reservation network.

Worldspan was formed by the recent merger of Delta Air Lines' Datas II network with the Passenger/Programmed Airline

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Covia's William Smith

Reservation System (PARS) — the net owned by Trans World Airlines and Northwest Airlines — and Abacus, a reservation network in the Far East owned by six airlines and Worldspan.

Only American Airlines, which runs the largest airline reservation network, says that it does not plan to use its SABRE network to support new nontravel services. American already has subsidiaries that offer services unrelated to the travel industry. Those businesses, which include a telemarketing company, do not use the SABRE network.

Airline industry analysts said they expect to see computer reservation networks serving customers outside the travel industry.

"I think it makes a lot of sense," said George James, chairman of Airline Economics, Inc., an aviation consulting and publishing firm in Washington, D.C.

"A problem they face within the transportation industry is this continual screening by government regulators," James said. "I wouldn't think they would have to worry about it in certain other industries as much as they do within the transportation industry."

Edward Starkman, airline analyst at PaineWebber, Inc. in New York, said a move to serve businesses outside of the transportation industry could help the reservation network companies compensate for slow domestic growth in their core airline business. **Z**

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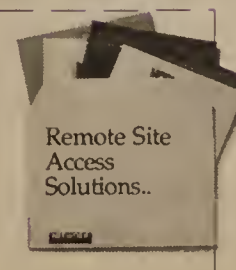
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Worth Noting

"If the U.S. securities industry is prohibited from getting cost-effective and efficient communications to Europe, then it will be stifled in its attempts to enter the unified European market of 1992."

Gregory Olinyk
President and chief
executive officer
Securities Communications
Networks, Inc.
New Canaan, Conn.

World News

Australia's **Civil Aviation Authority (CAA)** recently completed a new digital satellite network that allows the CAA to share air traffic data from major airports in the Southeastern part of the continent.

The CAA contracted with ComStream Corp. of San Diego to install the network, which cost about \$500,000. Remote sites use 2.4-meter antennas to exchange data via satellite at 19.2K bit/sec with CAA offices in Canberra, Australia.

A two-way voice channel is also included in the satellite network.

Switzerland's **Swissair** recently purchased Tandem Computers, Inc. NonStop CLX mid-range computers to handle an electronic data interchange application that is being developed to deal with the airline's air cargo.

Swissair will use the package to handle bills of lading, customs dockets and invoices. The airline expects the new system to be faster, more accurate, less expensive to operate and better for customer service than paper-based transactions. Software for the application is being developed by British Telecommunications PLC.

(continued on page 36)

Low-cost transatlantic service slated

Estimated charges by Securities Communications Networks for transatlantic network services

Pricing for leased circuits with bandwidth of:	Monthly charges		
	1-year commitment	3-year commitment	5-year commitment
56/64K bit/sec	\$5,500	\$4,750	\$4,400
128K bit/sec	\$9,000	\$8,500	\$8,000
192K bit/sec	\$12,750	\$11,750	\$11,250
256K bit/sec	\$16,250	\$15,000	\$14,250
384K bit/sec	\$21,100	\$19,250	\$18,250
512K bit/sec	\$28,500	\$23,000	\$21,750

Pricing for bandwidth on demand:

\$160 per hour for 64K bit/sec transatlantic circuit. Must be purchased in eight-hour blocks.

SOURCE: SECURITIES COMMUNICATIONS NETWORKS, INC., NEW CANAAN, CONN. GRAPHIC BY SUSAN J. CHAMPENY

Start-up firm to sell cut-rate int'l lines

Reseller buys capacity to U.K. at bulk discounts and passes savings of up to 25% to net users.

By Barton Crockett
Senior Editor

NEW CANAAN, Conn. — A start-up firm here plans to begin offering network services to the U.K. next month at prices as much as 25% below those from established carriers.

By buying network capacity from carriers in bulk and reselling it to users in the securities industry, Securities Communications Networks, Inc. (SCN) said it hopes to offer savings currently available only to large international users.

The company, which expects to turn a profit within a year, will offer leased lines and bandwidth-on-demand services (see graphic). Eventually, the firm also hopes to offer switched services.

SCN plans to begin offering network services Sept. 19 by selling capacity on a 1.088M bit/sec link on the Trans-Atlantic Telecommunications-8 (TAT-8) undersea fiber-optic cable and a 1.984M bit/sec circuit on the Private Trans-Atlantic Telecommunications-1 (PTAT-1) undersea fiber-optic cable. SCN is acquiring the circuits on PTAT-1 and TAT-8 through World Communications, Inc. and Mercury Communications, Ltd. The company will be provided with local loop facilities from British Telecommunications PLC, New York Telephone Co. and Teleport Communications Group.

SCN aims to become one of the first large-scale network resellers to focus solely on the international market.

"This is a super way to make money and make everyone happy," said David Castillo, senior vice-president and chief operat-

ing officer at the start-up, based here. "This is big for everyone [involved]."

According to Gregory Olinyk, SCN's president and chief executive officer, five users have already committed to using the new services. He predicted that SCN will become profitable within the first year of service, generating more than enough money to pay off the \$2 million in venture capital he said has been raised to get the firm off the ground.

Olinyk said that in addition to the \$2 million in venture capital, he has invested \$600,000 of his own money in the venture. He said SCN is now hiring 11 em-

"This is a super way to make money and make everyone happy," Castillo said.

▲▲▲

ployees as well as relying on consultants and vendors to get the network up and running.

Newbridge muxes

According to Castillo, users will access capacity on SCN's undersea fiber-optic circuits via dedicated connections to Newbridge Networks, Inc. T-1 multiplexers the company will maintain in New York and London.

The Newbridge mux in New York will be located at 67 Broad St. in Manhattan. The company (continued on page 36)

Opposition stifles proposal to privatize Australian net

State-run carriers may respond with lower rates.

By Walter Sweet
West Coast Correspondent

CANBERRA, Australia — Opposition by the country's Labour Party and some government lawmakers has persuaded officials here to shelve a proposal that would privatize the nation's telephone system.

Labour Party officials opposed the proposal before it was formally introduced to government officials because they said it would ultimately increase costs and reduce the number of services in the country.

Proponents of several plans to privatize the nation's phone system had hoped to muster the necessary backing to push for legislation that would open Australia's public network to outside investors, who could run the network and be responsible for adding new enhanced services.

Such a move would have gone a long way to making Australia an attractive site for network hubs in the South Pacific.

But with the setback, observers said those chances have been

severely diminished.

Observers had hoped that if such a proposal was accepted by lawmakers, privatization could help lower rates in some cases by as much as 30% and spur the in-

Privatization proponents hoped that the public net would be opened to outside investors.

▲▲▲

roduction of new innovative services.

Proponents had tried to garner support for the proposals by tying proceeds from the privatization of the carriers to the country's budget process ("Australia leans toward opening of public network," *NW*, July 9). They hoped to count revenue generat-

(continued on page 37)

Carriers' inroads abroad ease use of calling cards

By Daniel Briere
Contributing Editor

Until relatively recently, international travelers found it difficult, if not impossible, to charge international calls to their U.S. calling card unless they were willing to work through local operators and used AT&T.

But this is changing, and in the next few years, travelers overseas should be able to complete most of their international calls to the U.S. and to many other countries using U.S. calling cards.

Two initiatives are leading the charge. First, U.S. carriers are increasing the number of countries where they offer international operator services that let users abroad access operators in the U.S. to complete calls to this country. U.S. carriers are also rolling out calling card services that enable travelers abroad to bill calls destined for other countries to U.S. calling cards.

Briere is president of TeleChoice, Inc., a Manchester, Conn., telecommunications consultancy specializing in long-distance service analysis and network design.

A good example of the international operator services being unveiled is Sprint Express, which US Sprint Communications Co. introduced earlier this month.

With Sprint Express, a caller abroad dials a toll-free number and a US Sprint operator comes on the line to complete calls to the U.S. US Sprint operators accept Sprint FONCards and local exchange carrier calling cards or help users place collect calls.

While Sprint Express is available only in the U.K., the carrier plans to expand the service on Sept. 1 to Argentina, Australia, France, Hong Kong, Japan and Singapore. Service to Belgium, Colombia, Italy and West Germany will follow before year end.

Both AT&T and MCI Communications Corp. offer similar services. AT&T's international operator service, USA Direct, has been in place since 1985 and is now available in 80 countries. MCI launched its international service, Call USA, in October 1988, and supports it in 23 countries.

Both carriers are moving aggressively to expand the reach of their international operator service (continued on page 37)

THE BEST READ MOST IMPORTANT MOST USEFUL Network

NETWORK WORLD

The Newsweekly of User Networking Strategies

Volume 7, Number 18

An International Data Group Publication

April 30, 1990

U.S. to study Soderblom token patent

By Laura DiDio
Senior Editor

WASHINGTON, D.C. — In a move that could spell trouble for Olaf Soderblom's token-passing patent and monetary relief in his 50 licenses, the U.S. Patent and Trademark Office has agreed to reexamine the validity of Soderblom's patent.

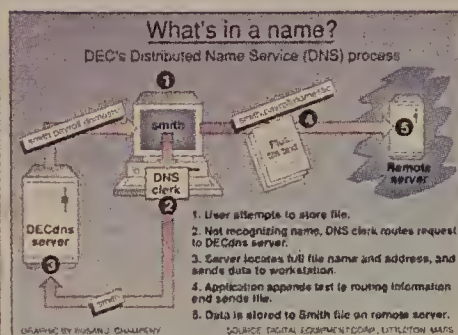
In its 1½ page decision, the Patent Office stated that the reexamination request from an anonymous vendor was granted in view of earlier patents issued to four engineers — including two from AT&T Bell Laboratories — before Soderblom was granted his patent in 1981.

"A substantial new question of patentability affecting Claims 23 to 33 of U.S. Patent No. 4,493,948 to Soderblom is raised by the request," the Patent Office statement said.

The 10 claims in question deal with open and closed data transmission loop schemes and are central to the issue of whether Soderblom's existing patent is applicable to today's token-ring and Fiber Distributed Data Interface local-area network technologies.

Invalidation of the patent or amending even portions of the patent could effectively render null and void the current license.

(continued on page 62)



DEC describes benefits of X.500 directory services

X.500 will extend DNS offering to incorporate non-DEC devices in DECnet Phase V directories.

Later this year, Digital Equipment Corp. is expected to announce DECnet Phase V, a major revision of its network software that will support the full suite of Open Systems Interconnection protocols.

According to Jane Brewer, DEC's product marketing manager for enterprise networking within DEC's Telecommunications and Networks Organization, one key component of that announcement will be

support for the X.500 directory services standard, which promises to give network administrators greater control over the hardware and software elements in their networks.



(continued on page 59)

Microsoft to market LAN Manager direct

Software giant to sell NOS to Compaq resellers to stabilize LAN Manager camp, jump start sales.

By Laura DiDio
Senior Editor

REDMOND, Wash. — In an attempt to boost lagging sales of its LAN Manager network operating system, Microsoft Corp. last week announced it will sell a version of the product directly to select Compaq Computer Corp. value-added resellers.

Microsoft's decision to put its marketing muscle directly behind LAN Manager is viewed as crucial if the product is to compete successfully with Novell, Inc.'s NetWare, which commands 60% of the network operating system market today. LAN Manager has only been available through OEMs to date.

"By selling its own version of LAN Manager, Microsoft is giving users freedom of choice," said Craig Burton, executive publisher of the *Clarke Burton Report*, a monthly research magazine. "Users will no longer be constrained to buying versions of the product that only work with a particular OEM's hardware. This will help accelerate the acceptance of LAN Manager."

Jonathan Yarnis, vice-president of the personal computer service at Garner Group, Inc. in Stamford, Conn., agreed. "The

move solidifies and stabilizes the LAN Manager camp and will spur application development."

"Microsoft and its OEMs have to present a unified front, especially in light of Novell's merger

(continued on page 6)

Fax facts

Average:	
Number of users per fax machine	10 to 50
Number of pages transmitted per day	15
Cost per page of transmission	35 cents
Cost per sheet of paper	5 cents
Cost of a fax machine	\$1,500



Net execs try to tame fax monster

By Tom Smith
New Products Editor

The explosive growth of facsimile machines has created a costly monster of which few companies are aware, let alone able to control.

Most large companies don't even know how many fax machines they have or how much they are spending on dial-up fax transmissions.

"It's like trying to manage envelopes or pieces of paper," said Bob Craig, vice-president of international network planning for The Chase Manhattan Bank, N.A. in New York. "People don't think it's worth the cost of managing it."

Yet the costs can be staggering. Annual transmission costs can be in the tens of millions of

(continued on page 8)

NETLINE

- AT&T TRIDOM plans to trial a pan-European VSAT network with two users. Page 2.
- A TARIFF IS USER is the loser in a heated battle between MCI and AT&T. Page 2.
- VENDORS AIMING for FDDI interoperability form a testing consortium. Page 2.
- SCOM FLECTS Benhamou to the post of president. Page 4.
- AMEX AWARDS MCI with a service contract that could be worth up to \$100m. Page 4.
- US SPRINT EXTENDS VLN services into international markets. Page 1.
- PRIVATIZING TELECOM in Eastern Europe is a question of capital. Page 43.

NEWSPAPER

FEATURE

Telecom privatization will aid int'l users

By Norman Lerner
Special to Network World

Most countries — industrialized, developing, capitalist and socialist — are at some stage of restructuring their telecommunications systems in order to accommodate and take advantage of the great political and economic changes now sweeping the globe.

In many places, this restructuring is taking the form of privatization of formerly nationalized telecommunications sys-

tems. This important trend raises major questions for multinational users of telecommunications services, including: Where is this happening and why? How will it affect the way we do business? And what will be the long- and short-term effects on telecommunications services to and from these countries?

This article examines the trend toward privatization in

(continued on page 38)



The results are in and Network World is the clear leader. The 1990 Wall Street Journal/ICA Member Study is conducted among members of the prestigious International Communications Association (ICA), an organization whose representatives purchase \$16 billion of information technology products and services each year.

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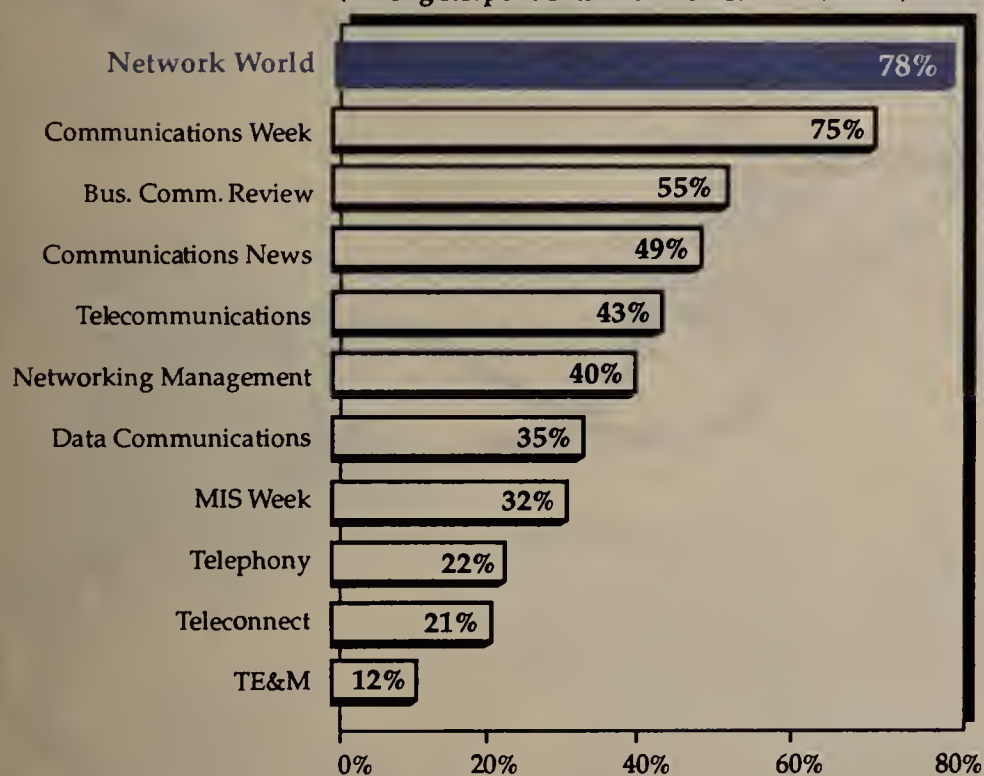
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Domestic Regular Readership

(Among Respondents with Domestic Networks)

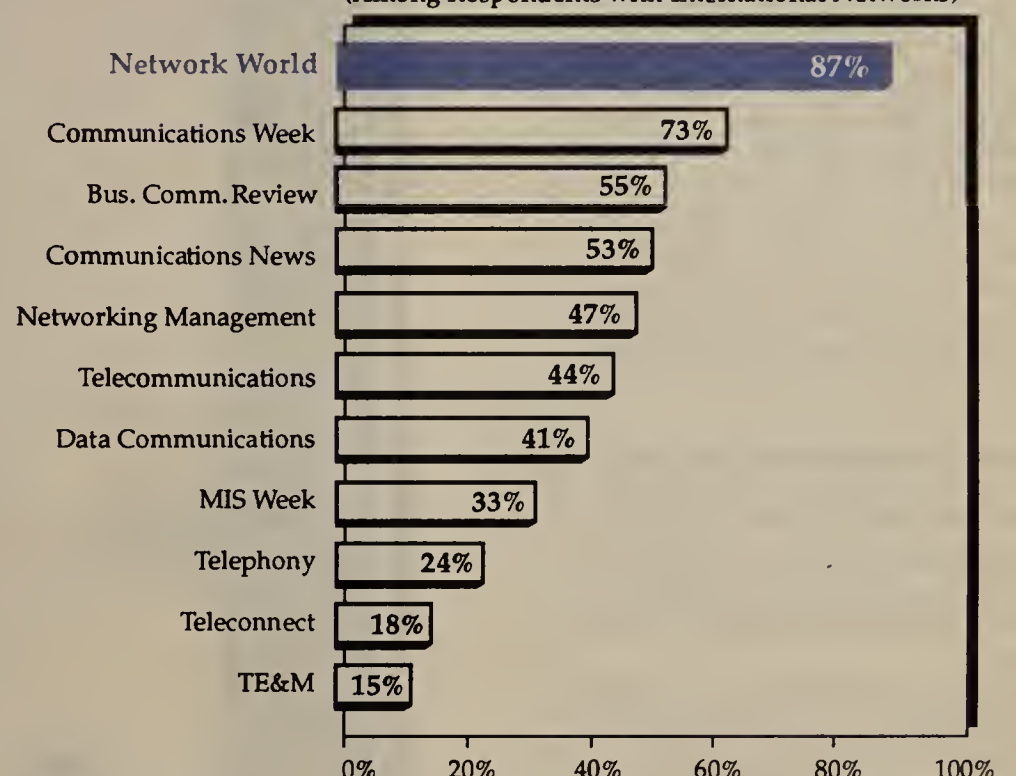


Base: 336 Respondents

Regular readership is at least three out of four issues.

International Regular Readership

(Among Respondents with International Networks)

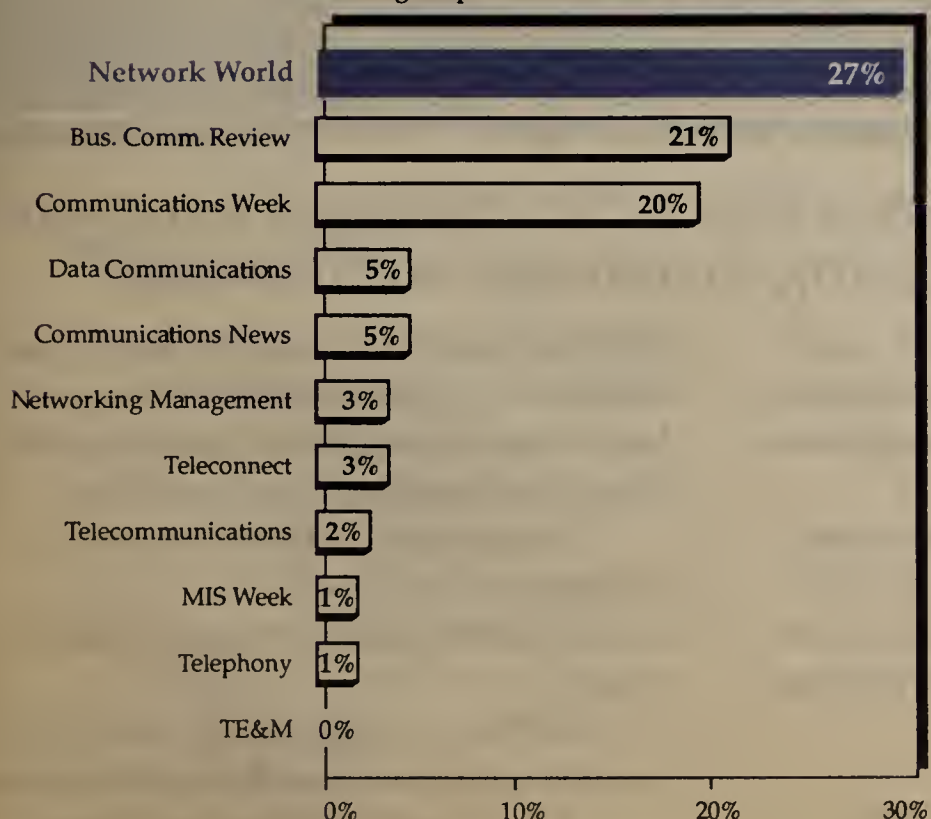


Base: 165 Respondents

Regular readership is at least three out of four issues.

Domestic Most Important/Useful

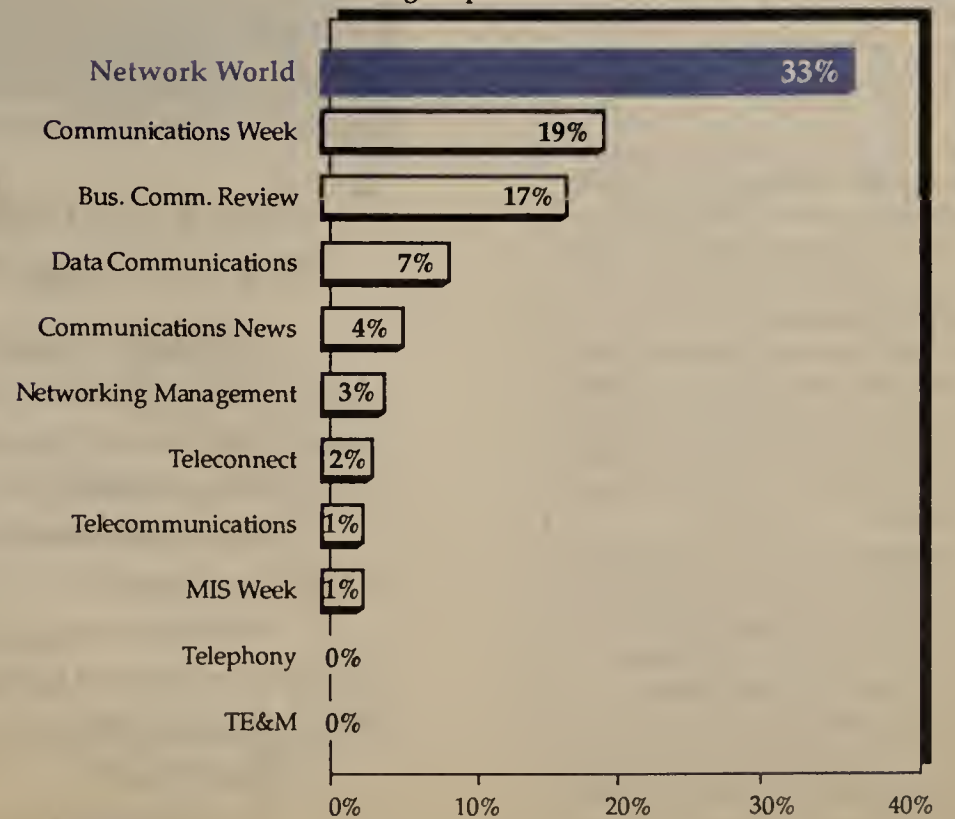
(Among Respondents with Domestic Networks)



Base: 336 Respondents

International Most Important/Useful

(Among Respondents with International Networks)



Base: 165 Respondents

Start-up firm to sell cut-rate int'l lines

continued from page 33

will monitor for real-time faults and alarms via a command center at 32 Broadway using a Newbridge network management system running on a Sun Microsystems, Inc. workstation.

This setup will be mirrored in London, with a network node at 250 City Road and a command center at 44 Worship St. Castillo said SCN will guarantee 98.5% reliability and bit error rates below 1/10,000.

In November, SCN plans to expand its service by purchasing 5.1M bit/sec of capacity on a mix of transatlantic fiber-optic and satellite facilities. The company said it also plans to open multiple points of pres-

ence in New York and London and expand into other countries in Asia, Australia and Europe within the next two years.

Controversial plan

Probably the most controversial part of SCN's venture is its plan to resell switched voice services between the U.S. and the U.K. Currently, resale of international switched voice services is prohibited in the U.K. and virtually every other country in the world except the U.S.

This is because of fears by national regulators that resellers could undercut prices from established service providers and skim revenues now used to subsidize local-loop services. SCN said it figures it could offer switched services to the U.K. that cost roughly 16% to 20% less than switched



SCN's Gregory Olinyk

services from established U.S. carriers.

The U.K. is examining the issue and may allow international resale of switched services by year end.

If these regulatory barriers fall, Olinyk said SCN would jump into the switched voice resale market. The firm estimates its switched voice resale revenues could total about \$1.8 million per year.

According to one user planning to buy services from the firm, voice resale could be critical to SCN's success.

"I think they're going to need [the revenues from] that to succeed," said the user, who requested anonymity. "But I believe they can provide a credible service, achieve a reasonable savings to the user and also make a bit out of it for themselves." □

World News

continued from page 33

The application will comply with the Cargo Community System-Interchange Message Procedures, an air cargo industry EDI transaction set standard, as well as with other protocols including EDI for Administration, Commerce and Transport (EDIFACT) and X.25 packet switching.

In the first phase of the project, Swissair will install two NonStop CLXs for production and one for development.

Swissair is developing the system in cooperation with the International Air Transport Association (IATA). Swissair and British Telecom will eventually market the system to other airlines through the IATA.

France Telecom was recently awarded a five-year contract to manage the global communications network of WorldNet, the U.S. Information Agency's (USIA) interactive video network that supplies cultural and information programs to sites overseas.

The network is controlled by the USIA from its Washington, D.C. studios and has 210 reception sites in 129 countries.

The network is often used by U.S. officials for live, interactive press conferences around the world.

It was first used in this capacity in 1983 for a videoconference to discuss the U.S. invasion of Grenada.

France Telecom began managing the network in 1987 and is now responsible for operating it 24 hours a day. Signals are sent from Washington, D.C. to West Africa, where they are picked up by France Telecom's Satellite Communications Center.

East Germany has asked **Mannesmann Mobilfunk**, a consortium in which San Francisco-based Pacific Telesis Group holds a 26% interest, to submit a proposal for extending cellular service into the country from West Germany.

Mannesmann Mobilfunk is now building one of the world's largest digital cellular systems, known as D2, in West Germany. D2 competes with the government-owned D1 system, which will also be extended into East Germany.

The consortium was the only group asked by East Germany to submit a plan for the cellular system, according to Lee Cox, president and chief executive officer of PacTel Corp., a unit of Pacific Telesis.

Mannesmann Mobilfunk must submit a proposal by the end of November.

The company expects to begin offering service in West Germany by sometime next summer. □



"That reminds me, now that we've managed to network everything, who's going to manage our network?"

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Opposition stifles proposal to privatize

continued from page 33

ed by the sale of state-run carriers as income for the nation's budget.

But due to the heavy opposition, proponents are backing off from the proposal until next year, at the earliest.

Observers said there has been talk for several years about privatizing the carriers but this year was the closest it has come to actually voting on the issue.

The setback could reduce the chances of users migrating to Australia as a network hub, they said.

"I'm not surprised because the Australians have been extremely conservative in their regulatory policies for telecommuni-

cations," said Ken Zita, an independent telecommunications analyst in New York.

Zita and other observers said they think privatization and competition could have lowered rates by 18% to 30%.

Losing a selling point

Without these lower rates, he said, Australia's attractiveness as a network hub for companies doing business in the South Pacific is reduced. "They're sort of gambling on the idea that time and distance will be irrelevant for corporate users," he said.

But according to Zita, there may be a silver lining for network users after all. State-run carriers may actually reduce rates in the near term to quell talk about privatization. He said rates could drop 6% to 10%. **Z**

Carriers' inroads ease use of calling cards

continued from page 33

vices, initially targeting countries most frequently visited by U.S. travelers.

As with many other areas of the international marketplace, AT&T's lead is substantial. The carrier's dominance is even greater, given that travelers can use its calling card to complete calls to the U.S. from 160 countries using local operators.

This service is available through a "1M" calling card number on AT&T's calling cards. Each AT&T calling card displays two numbers — a 14-digit code used by USA Direct, which when keyed in is validated by AT&T's domestic data bases, and an 11-digit 1M code accepted by foreign telephone companies, which is validated by local op-

erators using verification algorithms supplied by AT&T. Calls originated with the 1M codes are priced at AT&T rates and charged to a user's AT&T bill.

In Japan and the U.K., callers can use their AT&T calling cards to complete calls to countries around the world. These calls are billed at British Telecommunications PLC or Kokusai Denshin Denwa, Ltd. rates and appear on the caller's monthly bill.

US Sprint also will be able to support "third country" calling, in which travelers can bill calls to countries other than the U.S. to U.S. calling cards. The carrier will support that functionality through its Global FONCard, which is scheduled for introduction in 1991. The Global FONCard will be one of the major services supported through US Sprint's Global FON alliance with Cable & Wireless PLC, a network conglomerate in London that owns carriers around the world, including Mercury Communications, Ltd. in the U.K. and the Hong Kong Telephone Co.

Using Global FONCard, users will be able to access English-speaking operators in the U.S., U.K. and Hong Kong in order to complete calls to these countries and to other countries with which Cable & Wireless has calling card billing arrangements. Other carriers are also expected to partici-

MCI's ability to let travelers bill "third country" calls to its calling card hinges on foreign carrier acceptance of the international "89" standard, a code that typically has 19 digits.

▲▲▲

pate in the Global FON alliance and to support the Global FONCard.

MCI's ability to let travelers bill "third country" calls to its calling card hinges on foreign carrier acceptance of the international "89" standard, a code that typically has 19 digits and is not only compatible with calling cards but credit cards as well. While formally adopted by the Consultative Committee on International Telephony and Telegraphy in 1987, this standard has not been accepted by any carrier.

MCI says it plans to begin supporting the international 89 code in mid-1991. But the carrier may back off this commitment if other carriers, such as AT&T, decide not to support the standard.

AT&T had planned to adopt the international 89 standard as a replacement for both sets of numbers on its calling cards as soon as mid-1991, but sources now say the carrier will stick with its existing 14-digit card numbers for domestic calls and only use international 89 numbers as a replacement for 1M numbers. Indeed, AT&T's decision not to use the international 89 standard on its new Universal Card, a combination credit card/calling card, underscores the fact that AT&T is not adopting the standard domestically in the near term. US Sprint says it will adopt the international 89 standard in the first quarter of 1991 when it launches its Global FONCard. All future FONCards will support the standard, according to the carrier. **Z**

enhanced, making it easier than ever to use, monitor problem alerts, and "talk" with IBM and non-IBM systems.

Of course, there are other attractive features of NetView to consider.

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PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

Gateway links MCI Mail, Inter-Network Courier

Consumers Software, Inc. recently introduced software that enables users of its Inter-Network Courier electronic mail for local-area networks to send and receive messages via MCI Communications Corp.'s MCI Mail.

The Network Courier MCI Mail Gateway is software that runs in a dedicated IBM Personal Computer XT or AT. It sends messages from the Inter-Network Courier to the MCI Mail network after converting them to MCI Mail format.

The Inter-Network Courier supports LAN-to-LAN communications on DOS-based LANs including Novell, Inc.'s NetWare and Banyan Systems, Inc.'s VINES.

The software gives Consumers Software users all of the communications options available to MCI Mail users. They can exchange messages with MCI Mail users and send facsimiles from their LAN nodes to any Group III fax machine.

In addition, they can exchange messages with users of several other E-mail packages that have MCI Mail interfaces.

The gateway is available now and costs \$695.

Consumers Software, Inc., 73 Water St., Vancouver, B.C. V6B 1A1; (604) 688-4548.

Mountain Computer plans backup management pack

Mountain Computer, Inc. plans to roll out at the NetWorld show in Dallas next month **FileTalk 2.0**, data storage management software for local-area networks.

The software, which traditionally has been used by LAN administrators to transfer files to backup devices, has been expanded to manage LAN backup from a central terminal. This will allow users to share multiple tape drives across a network to optimize available storage.

The company plans to ship the software in the second quarter of 1991. Pricing has not been set.

Mountain Computer, Inc., 300 El Pueblo Road, Scotts Valley, Calif. 95066; (408) 438-6650. □

Northern Telecom bolsters software for packet switch

Firm adds support for LPDA-2, protocol analysis.

By Tom Smith
New Products Editor

NASHVILLE — Northern Telecom, Inc. recently enhanced its DPN-100 packet-switch software to support an IBM protocol for modem management, enabling net managers to isolate network faults.

The vendor also added a protocol analysis function to the DPN-100 software that enables it to monitor and control network nodes.

By supporting IBM's Link Problem Determination Aid-2 (LPDA-2) protocol, Northern Telecom's DPN-100 software generic Release 27 (G27) enables the switch to manage IBM- and other LPDA-2-compliant modems.

From a central-site net management station, users can perform a variety of tests, including modem self-tests, line and status tests and loop-back checks. Previously, the DPN-100 didn't support any of these diagnostics. The tests can be initiated from DPN Advisor, the DPN-100 management software that runs on a Sun Microsystems, Inc. workstation.

Northern Telecom also announced that the G27 software

now supports Intel Corp. 80386 microprocessors, which are used in newer DPN-100 models.

DPN trace

The new protocol analysis functionality is supported through a G27 capability known as DPN trace, which enables net managers at a central-site workstation to send commands to and receive data from nodes on the network.

DPN trace would allow a user to look at call setup information, for example, to help determine what is preventing a call from being established.

DPN trace can be initiated from the DPN Advisor management station or from an ASCII terminal linked to the DPN-100 switch.

Previously, users could only perform these functions using a local network analyzer.

G27 will be available in October for prices ranging from \$1,500 to \$77,000, depending on the size of the DPN-100 switch used.

Northern Telecom can be reached by writing to 200 Athens Way, Nashville, Tenn. 37228, or by calling (615) 734-4251. □

Gateway lets LAN servers and minis exchange files

By Walter Sweet
West Coast Correspondent

SOLVANG, Calif. — Comware International next month will unveil a gateway that supports file transfer between local-area networks and IBM minicomputers.

The new ComGate/FS is a personal computer-based gateway that links IBM Application System/400, System/36 and System/38 minicomputers to file servers attached to local or remote LANs. It enables LAN workstation users to access data and store files on the minicomputers.

The product supports IBM's LU 6.2 Advanced Program-to-Program Communications protocol, which enables workstation users on a LAN to access the IBM minicomputers through the gateway without having to establish an IBM 5250 terminal-emulation session.

According to David Retz, president of Comware, using IBM's LU 6.2 protocol allows the device to transfer files at higher data transfer rates than other products not

using the protocol. It also allows users to write their own applications for an IBM minicomputer to access files on a LAN server.

The gateway supports servers running Novell, Inc.'s NetWare, 3Com Corp.'s 3+ and 3+ Open, and the IBM Personal Computer LAN Program attached to Token-Ring, Ethernet and Arcnet LANs.

Retrieving or updating file data can be done either by the host or the personal computers. Users can request straight ASCII text files or binary files.

ComGate/FS comes in an eight-port or 16-port model, which support eight or 16 file-transfer sessions concurrently with LAN users. The device supports a variety of X.25 and asynchronous wide-area interfaces.

ComGate/FS is expected to be available in late September. It costs \$9,500 for an eight-port model and \$12,900 for 16 ports.

For more information, contact Comware at P.O. Box 410, Solvang, Calif. 93464, or call (805) 686-1262. □

FTP Software's SNMP Tools

Standard SNMP support		Added features	
Commands	Function	Commands	Function
get	Request and display value of specific MIB variable	stat	Display data such as packets received by a LAN interface
next1 and nextx	Request and display value of additional MIB variables	mon	Monitor host responses to SNMP and TCP/IP status requests
sett	Change SNMP variables	dog	Query hosts and display responses for variables such as errors
trapd	Capture and display SNMP alarms	graph	Generate color bar graphs for SNMP variables such as packets received

MIB = Management Information Base
SNMP = Simple Network Management Protocol

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: FTP SOFTWARE, INC., WAKEFIELD, MASS.

FTP unveils low-cost SNMP software pack

Vendor offers SNMP Tools to monitor and control devices on TCP/IP nets from a DOS workstation.

By Tom Smith
New Products Editor

WAKEFIELD, Mass. — FTP Software, Inc. recently unveiled Simple Network Management Protocol (SNMP)-compliant software that enables users to manage, from a DOS-based workstation, devices running SNMP agents from third-party vendors.

The product, SNMP Tools, is software that runs on DOS workstations and monitors and controls Transmission Control Protocol/Internet Protocol nets. By contrast, other SNMP packages run on more expensive Unix workstations, driving up user costs and forcing them to use a more complex operating system.

SNMP is the standard protocol for managing TCP/IP networks.

SNMP Tools runs on IBM Personal Computer ATs, XTs or Personal System/2s. It communicates with other vendors' SNMP agents that support the Internet Advisory Board's Request For Comment (RFC) 1065, which defines a standard Management Information Base (MIB), the data base of SNMP information.

The components of the MIB that can be accessed by SNMP Tools or any SNMP management station vary by the vendor's level of adherence to the RFC.

In addition to support for standard SNMP commands, FTP added four of its own management commands to supplement the product's capabilities (see graphic).

The SNMP commands supported are known as get, next1, nextx, sett and trapd. Get enables SNMP Tools to request and display the value of an individual MIB variable, such as the number of pack-

ets transmitted. Next1 and nextx allow users to request and display values for additional variables in an MIB subtree after they have executed the get command. A subtree is a group of related objects, such as packets sent and received, that are described by the MIB.

Sett allows users to change SNMP variables, such as activating or deactivating an interface card. Trapd lets users capture and

The product runs on IBM Personal Computer ATs, XTs or Personal System/2s.

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display SNMP "traps," or alerts, such as coldstart, which means a user is booting up a TCP/IP node for the first time.

In addition to the standard SNMP commands, FTP Software added to the software several of its own commands for enhanced management capabilities. Those commands are stat, mon, dog and graph. Stat allows users to see a display of information such as packets received by a LAN interface. Mon lets users monitor responses from TCP/IP hosts to SNMP and TCP/IP status requests.

Dog queries TCP/IP hosts at specific intervals for the values of variables, such as number of errors. It displays those values in a

(continued on page 68)

OPINIONS

REGULATORY POLICY

BY STUART BROTMAN

Sikes stresses competitive aspect of deregulation

Contrary to popular belief, Federal Communications Commission Chairman Alfred Sikes so far has proven to be a more committed proponent of deregulation than his two predecessors, Dennis Patrick and Mark Fowler. Unlike Patrick and Fowler, however, he has wisely chosen to retrace the steps of telecommunications deregulation before leading the FCC further down the deregulatory road in the name of limiting government intervention in the private sector.

Sikes, a conservative Republican with an extensive background as a broadcast radio station owner, certainly appreciates the virtues of minimizing regulatory paperwork for communications enterprises. But to his credit, he has recognized that

deregulation is only one part of a successful policy equation. The other part — too often overlooked when ideology reigned during the Patrick and Fowler years — is competition. The public interest premise that justifies deregulation involves removing the visible hand of government from shaping — and skewing — dynamic telecommunications markets. In turn, the theory goes, newer entrants will be induced to join the competitive fray, resulting in more diverse service offerings, higher quality and lower costs for business and residential users alike.

The 1980s created an imbalance in this formula by promoting deregulation for its own sake, rather than as a means to further competition. Today, it seems clear that the policy-making community in Washington, D.C. is beginning to realize that deregulation must be implemented in practice, not just worshipped as a shrine advancing the cause of "getting government off our backs."

The 1980s created an imbalance in this formula by promoting deregulation for its own sake, rather than as a means to further competition. Today, it seems clear that the policy-making community in Washington, D.C. is beginning to realize that deregulation must be implemented in practice, not just worshipped as a shrine advancing the cause of "getting government off our backs."

The two dimensions of deregulation

Sikes, so far, has been a relentless teacher, reminding us that deregulation clearly has two dimensions: minimizing the role of government and actively promoting competition. And he has tried to back up this rhetoric by reorienting the FCC to scrutinize what constitutes effective competition in various telecommunications markets.

This change cannot help but heighten the importance that interested parties appearing before the FCC must place on presenting empirical evidence of what the marketplace really looks like.

The agency, under Sikes' leadership, will be asking more difficult questions concerning whether deregulation should be continued or expanded if no obvious competitive effects can be demonstrated. The alternative is to initiate government regulatory policies that will create a better sense of equilibrium between deregulation and competition.

Thus, the overall accomplishment of the Sikes commission to date is not merely a kinder and gentler FCC. Rather, it is a pragmatic acceptance that deregulation must be responsive to what is happening in relation to competitive entry and operations.

This is the litmus test that Sikes has established for the 1990s. His ability to initiate policies that conform to that standard will ultimately determine whether the next year — and future years — of his chairmanship will be as successful as the first year has been. ■

Brotman is a Boston-based communications lawyer and management consultant.

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EDITORIAL

Of power outages and international crises

A couple of items for your consideration this week:

As if users really needed another reminder, the massive power outage in New York's financial district on Aug. 13 dramatically illustrates the need for comprehensive disaster recovery planning.

The outage, which affected more than 4,000 customers in the world's most important financial center, knocked out stock and commodity exchanges and interrupted the operations of critical electronic funds transfer systems and other user networks. Full power to the area wasn't restored until last week.

The situation hammered home once again the message that networks and data processing facilities are alarmingly vulnerable not only to acts of God, but to disruptions of the public power and telephone facilities on which they rely — particularly in major metropolitan areas.

Such problems seem to have

become a routine occurrence; reports of cable cuts, as well as switch and power outages, have become commonplace.

Despite that, some users in New York apparently were caught off-guard by the power outage. Many were able to kick in backup generators or fall back to auxiliary network and DP facilities. But other companies had to simply close up shop — either immediately or when limited reserve power systems failed — because they had no disaster recovery plans in place.

The Manhattan blackout serves as a grim warning that a key part of any network strategy is disaster preparedness. Preparedness includes not only planning for the worst but testing the plan to ensure that the network will stay up when the lights go out.

The crisis in the Middle East is having an impact not only at the gas pump, but in the network

world as well.

Many network executives are currently involved in budgeting for the coming year, and their budgets could be affected by events halfway around the world.

Economic experts fear that a prolonged standoff in that volatile region could push the U.S. into recession. A recession could dramatically shift the fortunes of many U.S. companies and alter their spending on networks and data processing.

The prognosis isn't all gloomy. For some companies, particularly those in the domestic energy business, the Middle East crisis may boost business and lead to an increase in information system spending.

In the coming weeks, network managers will need to work closely with upper management to understand the ramifications of the crisis for their firms and to tailor spending appropriately. ■

OPINIONS

SPECTRUM ALLOCATION

BY JAMES KOBIELUS

Keeping watch for signs of gridlock in the heavens

In the U.S., new wireless communications technologies, such as radio local-area networks and personal communications networks, must beg for radio frequency (RF) spectrum allocations. The only way a new wireless technology can get established is if the Federal Communications Commission re-allocates spectrum that previously had been assigned to a different service.

According to a report last year from the U.S. Government Accounting Office (GAO), there is no substantial cache of unused RF bandwidth that the FCC can use to satisfy new allocation requests. The GAO report highlights a perennial problem facing not just the U.S., but all nations: How will humanity share this common transmission medium — the RF spectrum — as demands multiply?

One of the most disturbing findings of the GAO report is that the FCC has no formal long-range plan to assist it in matching spectrum bandwidth allocations to future domestic needs. The spectrum planning that the FCC does is carried out only to support its rule-makings on specific airwave services and its work at international regulatory conferences.

In fact, many FCC staff members doubt the utility of long-range RF spectrum management planning on the grounds that it is difficult to predict future spectrum demand, given the rapid development of telecommunications and information processing technologies. But some sort of long-range RF spectrum management plan is essential, preferably at both the global and domestic levels. Imperfect knowledge of future trends and developments is no excuse for failure to plan.

I would like to propose the

Kobielus, a contributing editor to Network World, is a telecommunications analyst with Network Management, Inc., a Fairfax, Va.-based consulting firm.

beginnings of such a framework. It regards the earth's atmosphere as a shared communications bus — an ethereal Ethernet — into which signals and noise are continually pouring. The scale and scope of this bus are unlike anything we mortals might build for ourselves: extremely high bandwidth, unlimited access and a virtually unlimited mix of traffic types.

The challenge before us as a species is to behave like any good communications engineer, maximizing bus efficiency while minimizing real-time contention among users. However, ri-

Imperfect knowledge of future developments is no excuse for failure to plan.

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gidity in the way the RF spectrum historically has been managed are preventing the human race from making the most of the airwaves. To maximize collective utilization of the RF spectrum, we must refine our mastery of three bandwidth-sharing techniques:

■ **Space division.** Frequencies can be reused throughout the spectrum because signals often stay within well-defined geographic boundaries, such as a satellite's footprint or a television transmitter's broadcast region. Any technique that enhances our ability to confine RF signals to ever narrower paths — for example, spot beam — enables us to pack the airwaves more densely with information.

Perhaps the ultimate space-division technique is to migrate traffic out of the ether and confine it to terrestrial cables, thereby freeing up on-air bandwidth for other uses. Contrary to what many in the industry may think, fiber-optic technology

represents the salvation, not the death knell, of the satellite industry.

By removing traffic from the airwaves, fiber optics provides carriers with the surplus RF bandwidth they will need to serve burgeoning markets, such as remote sensing, radio locations and very small aperture terminals — but only if regulators will allow them the flexibility to reassign spectrum for these services.

■ **Frequency division.** Scattered throughout existing RF bandwidth allocations are narrow frequency bands that for various economic, technological or regulatory reasons are lying unused. There's no telling how much surplus RF capacity there is in the nooks and crannies of existing spectrum bands across the earth bus.

The FCC has very wisely allowed FM radio licensees to lease out subchannels to low-speed data services. What's needed everywhere are more flexible regulatory and market mechanisms that enable spectrum licensees to subdivide and farm out their allotments in much the same way as agrarian tenants can make improvements on their holdings.

■ **Time division.** Engineers have dramatically improved the efficiency of both airwave and terrestrial transmission circuits through digitization, time-slicing, packetizing and interleaving of traffic. Multidrop satellite protocols are continually being refined to eke more performance from existing channels.

Undoubtedly, plenty of gaps remain in existing over-the-air communications systems. One wonders to what extent the regulatory process could be used to encourage further improvements in the time division of the RF spectrum.

The airwaves will never get any less crowded. It's up to humanity as a collective organism to devise the political, regulatory, economic and technological means for exploiting this celestial resource. ■

TELETOONS

BY FRANK AND TROISE

I've gone through this call detail invoice ten times, but I still can't figure out who's been calling 976-MICE...



LETTERS

Interconnection nonsense

Ameritech's blather about the perils of interconnection is standard "RBHC-speak" when responding to issues of competition and market-based services ("Should BOCs give CO access to alternative local carriers?" NW, July 2).

According to Ameritech, the improved local interconnection arrangements sought by Teleport Communications Group, Metropolitan Fiber Systems, Inc. and others are illegal, discriminatory and not in the public interest.

■ **Illegal?** Specifically to encourage competition, the New York State Public Service Commission (PSC) last year ordered New York Telephone Co. to provide Teleport with "actual collocation" or comparably efficient interconnection that is "technically and economically comparable to actual collocation." And since 1986, New Jersey Bell Telephone Co. has provided Teleport with an interconnection that meets the New York PSC standard.

If anything is illegal, it is the Bell operating companies' refusal to provide potential

competitors with equal interconnection to the bottleneck central office and loop network.

■ **Not in the public interest?** Local common carriers such as Teleport thrive precisely because they give customers what they want: superior prices and service, benchmark standards to measure regional Bell holding company performance and competitive choices that strengthen the public network. In every state where we operate, the state public utility commission has found that Teleport's operation *is* in the public interest.

■ **Discriminatory?** Alternative local carriers don't want a "special deal." They only want to connect their local fiber networks to the local

(continued on page 61)

Network World welcomes letters from its readers.

Letters should be typed, double-spaced and sent to Editor, Network World, 161 Worcester Road, Box 9172, Framingham, Mass. 01701.

Letters may be edited for space and clarity.

EVER WONDER HOW BRUCE WILLIS in Die Hard 2 managed to make a phone call from Washington, D.C.'s Dulles Airport using a phone clearly labeled Pacific Bell? Send us your theories in a column. Columns should be 600 words in length and submitted on disk, via modem or through MCI Mail at 390-4868.

If you'd like to write a column, call Alison Conliffe, assistant features editor, at (508) 820-7416 or fax your idea to us at (508) 820-3467.

The interconnectivity nightmare

By DAVID FORSBERG

The adage "different strokes for different folks" doesn't hold up well in the typical corporate computing environment — especially if the corporation has field offices all over the country. Corporatewide communications becomes a nightmare, if not downright impossible, if each office develops its own unique hardware and software system.

What's a network manager to do when the office in Houston uses Hewlett-Packard Co. hardware, the Chicago office uses Digital Equipment Corp. hardware with DECnet, the Atlanta office uses only IBM and compatible microcomputers running Novell, Inc.'s NetWare and the corporate headquarters is strictly IBM mainframe?

If the above scenario aptly describes your company's current communications systems, it's only a matter of time before your boss comes to you and says, "We have a real mess going on with all of this dissimilar equipment here and in the field. I'm tired of shipping data back and forth over point-to-point modem lines. See what you can do to organize this mess into some coherent structure that makes sense and won't cost us an arm and a leg. Plan to

provide us with the capability to transfer files among all field units."

Depending on your situation, your boss may add, "Oh, and plan to provide electronic mail and virtual terminal service so that all of the field units can do work on the IBM mainframe."

Problems with multivendor interconnectivity are not unique to any particular industry, nor are they limited only to large corpo-

Getting equipment from multiple vendors to communicate is the stuff bad dreams are made of, but TCP/IP provides one possible solution.

rations. The reasons many companies find themselves in situations like the one described above vary, but they can usually be traced to at least one of three similar causes.

■ **Proprietary dependence.** Until recently, companies that used a particular vendor's hardware felt forced to use that vendor's communications subsystem as well. Hence, those companies that bought DEC minicomputers were strongly advised to use DECnet, DEC's proprietary communications solution for local- and wide-area networking. The same situation existed for Data General Corp., HP, IBM and all of the non-Unix environments.

Several vendors selected Unix as their primary, and in some cases, their only operating system. In these instances, the common Unix environment allowed these vendors' equipment to communicate with one another. However, some Unix-based companies modified the Unix code so that it would not easily work with the other Unix derivatives.

Couple this situation with companies' tendency to make purchasing decisions more on the basis of end-user wants than on consideration for communications interfaces — and add to that the proliferation of decentralized budgeting, where field offices can buy computing solutions independently of the home office — and it's easy to see how the multivendor interconnectivity dilemma was created.

■ **Open architecture failure.** The industry has the ability to solve open architecture problems. The Department of Defense generated one technique many years ago with the Advanced Research Projects Agency Network (ARPANET), showing that it is very possible to connect dissimilar computers so that they can communicate regardless of their operating systems.

Standards currently exist that could facilitate interoperability, but they change rapidly and the

(continued on page 46)

Forsberg is a consulting manager for The Orkand Corp., a professional services firm in Silver Spring, Md.





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(continued from page 42)
industry is really not interested in keeping up with them. All of the planning going on in the industry to support the Open Systems Interconnection architecture will bear fruit three or more years from now but is of little practical use today.

■ **Large investment in hardware.** The equipment needed to operate a corporation today is ex-

pensive. Therefore, companies strive to use existing equipment as long as possible without upgrading to some new idea. The ideal solution to the multivendor interconnectivity dilemma would be a system that allows companies to keep all of their existing equipment, yet enables the various computers to communicate.

Much of the multivendor inter-

connectivity problem can be attributed to the fact that computers and communications traveled different paths to their present states. Communications developed with the telephone system; computers proliferated by using the telephone medium to transmit data.

Even today, much of data communications is dictated by a system designed for voice communi-

cations. Computer technology and computer architectures have developed along their own lines of engineering, and the industry is still wrestling with the best methods to amalgamate the two.

In their zeal to compete, computer vendors could not wait until communications standards and protocols were developed and agreed upon. Instead, each computer manufacturer developed its

own methodology. IBM, because of its dominance, established many de facto standards that still exist today, requiring other vendors to provide some interface to the IBM protocol.

Users have also been historically reactive. Their overriding concern has been to solve today's problem with yesterday's communications technology and let tomorrow take care of itself. This attitude has allowed each computer vendor to concoct unique network hardware and software that does not integrate easily—or at all—with other vendors' products.

Because of the preoccupation with solving the current problem, corporations have neglected to plan for their strategic needs. Strategic information resource planning is relatively new, not embraced by all corporations and frequently ignores the data communications needs of the companies and their end users. The re-

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One potential
solution to
interconnectivity woes
is OSI.



sult is often enclaves of automation that do quite well at fulfilling specific needs but fail to integrate with the corporate strategic plan.

Open systems planning

One potential solution to interconnectivity woes is OSI. Working together, the seven layers of the OSI model provide a clear concept of an ideal networking system. The purpose of OSI is to provide an internationally accepted standard for networking that will enable orderly development of new networking products.

The U.S. government has been the front-runner in the push toward OSI, developing the Government OSI Profile (GOSIP) standard specifying the OSI protocols required in government procurement contracts. The problem is that OSI will comprise many different protocols from the physical layer to the presentation layer, and not all of them currently exist.

Furthermore, those protocols that exist do not always work well together. Consequently, some protocols will not be available for several years. For these reasons, the workhorse in interconnectivity today is Transmission Control Protocol/Internet Protocol.

TCP/IP is a protocol suite that operates at Layers 3 and 4 of the OSI model. This option was originally developed by the Department of Defense for the ARPANET project, which proved the

(continued on page 60)



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that will streamline your work, make it easier. The way MICOM's X.25 does.

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GUIDE

VOICE-
MESSAGING
SYSTEMS

Voice messaging matures

CONTINUED FROM PAGE 1

ing systems is greeted by an automated attendant, given a menu of numbers to choose from to connect to various departments and offered the option of entering a person's name if the extension number isn't known.

The caller's interaction with the voice-messaging system does not stop there. Some systems allow the caller to request that the information be sent out by facsimile. Such an application, which typically also uses voice response technology, allows a customer needing information to call a supplier and then be guided by the voice-messaging system through a series of menus to the appropriate information. Many of these systems allow customers to access sales information and place orders.

Some systems even allow a caller who wishes to leave an urgent message to have the intended recipient notified by beeper. Or the caller can leave a voice message and request that it be bumped up in the queue of messages on the system to get a faster response from the called party.

An internal user of a company's voice-messaging system can record a message and send it to one person, all the people in one department or to everyone in the company — a function called

CHART • GUIDE

A chart comparing the features of a variety of voice-messaging systems begins on page 51.

multiple broadcasting. The message can be delivered immediately or the sender can delay the delivery by up to a year.

If the company has geographically dispersed sites, the caller can save the organization money by programming the voice-messaging system to send the messages only when long-distance telephone rates are lowest. In addition, users on opposite coasts can virtually eliminate time zone differences by exchanging voice mail messages.

PC vs. stand-alone

Products in the voice-messaging market can be broken into two types — personal computer-based products and stand-alone systems.

Personal computer-based systems, such as Applied Voice Technology, Inc.'s CallXpress 400 Se-

(continued on page 52)

No longer just an "office answering machine," voice-messaging technology offers user companies cost benefits and sophisticated features.

Times change. Will the LAN connections you choose keep pace?

There's no doubt about it. Time will change the way you connect your LANs. Right now, you may only need to bridge a few remote sites. But as the number of sites and devices increase, your network will require the greater flow control and security features of a router.

How do you make sure your LAN connections anticipate these changes? By choosing flexible products, like the ACS Series 4000 from ACC.

As your needs change, Series 4000 internet-working products adapt to meet those needs.

Series 4000 products are based on a simple concept—flexibility. The advanced hardware platform is bundled with different internetworking software programs. Just insert a new diskette, and you've

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Other vendors' offerings limit flexibility by using proprietary protocols. ACC's Series 4000 products use industry-standard protocols, such as TCP/IP, DECnet, XNS, Novell's IPX, and Appletalk—giving you the flexibility to operate with your existing inter-networking products.

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As standards emerge, new software programs will accommodate evolving networking technology. We'll continue to keep pace with network standards as we have for the past 13 years.

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The Interconnectivity Source

Voice-messaging products (continued on page 54)

Company	Product	PBX(s) supported	PC-based or stand-alone	Maximum number of mailboxes	Maximum greeting message	Maximum number of simultaneous users	Disk storage/hours	Time/date stamp	Escape to operator	Autodelete	Features	Price
Active Voice Corp. Seattle, Wash. (206) 441-4700	Repartee	Most major brands	PC	65,000	60 min	Depends on number of ports	660M bytes/56 hours	Yes	Yes, configurable by administrator	Optional, configurable by administrator	MTB, ON	\$3,400 to \$56,000
American Telesystems Corp. Atlanta (404) 266-2500	Express Messenger III	Most major brands	Stand-alone	3,000	20 min	24	1G byte/84 hours	Yes	Yes, configurable by administrator	Yes, can be programmed by administrator from 1 day to 1 year	MTB, FD, TG, ON, ND	Starts at \$8,900
Applied Voice Technology, Inc. Kirkland, Wash. (206) 820-6000	CallXpress 400 Series Voice Mail and Call Processing System	Most major brands	PC	Limited only by disk capacity	45 min	16	600M bytes/60 hours	Yes	Yes, "0"	Yes, set by system administrator	MTB, FD, TG, ON, ND ¹	\$15,560 for 4-port, 35-hour system; \$70,340 for 16-port, 60-hour system
AT&T Parsippany, N.J. (800) 247-7000	Integrated Solution II, Release 2	AT&T System 25	PC	100	6 min	100	200M bytes/12 hours	Yes	Yes, "0"	No	MTB, ON, ND	\$15,000
AT&T Business Communications Systems Bridgewater, N.J. (800) 247-1212	Audix	Most major brands	Stand-alone	4,000 per node; 32,000 per Audix system	Configurable	256	42,560M bytes/3,200 hours	Yes	Yes, "0"	Yes, set by system administrator	MTB, FD, TG, ON, ND	\$38,000 for 4-port, 13-hour system; \$229,000 for 32-port, 104-hour system
	Audix Voice Power	Definity Communications System Generic 1; System 75 and System 25	PC	300	2 min	12	300M bytes/38 hours	Yes	Yes, "0"	No	MTB, ON, ND	\$18,000 for 4-port, 5-hour system; \$27,000 for 12-port, 35-hour system
BMC Group, Inc. Tucker, Ga. (404) 934-7613	VoiceXchange	Most major brands	PC	Unlimited	Unlimited	32	900M bytes/85 hours	Yes	Yes, "0"	Customer option	MTB, ON	\$7,195 to \$40,000
Centigram Communications Corp. San Jose, Calif. (408) 957-4742	Centigram VoiceMemo II	Most major brands	Stand-alone	10,000	Stand-alone	Unlimited	960 hours	Yes	Yes, "0"	Yes, can be set, ranges from end of the day to 1 year	MTB, FD, TG, ON, ND	Starts at \$17,000
Comverse Technology, Inc. Woodbury, N.Y. (708) 699-8558	Trilogue Infinity	Central office switches, cellular switches	Stand-alone	300,000	Unlimited	1920	6,800 hours	Yes	Yes, "0"	Can be set by system administrator	MTB, FD, TG, ON, ND	Starts at \$50,000
Digital Sound Corp. Carpinteria, Calif. (805) 566-2000	VoiceServer 2110	Most major brands	Stand-alone	3,000	8 min	96	760M bytes/up to 551 hours	Yes	Yes, "0"	Yes, adjustable for up to 1 year	MTB, FD, TG, ON, ND	\$73,275 to \$400,000
Dytel Corp. Schaumburg, Ill. (708) 519-9850	Call Processing Exchange	Most major brands	Stand-alone	6,000	66 min	32, up to 144 phone lines	663M bytes/45 hours	Yes	Yes, "0"	Yes, saves messages for up to 255 days	MTB, ON, ND ¹	\$20,000 to \$200,000
Enhanced Systems, Inc. Norcross, Ga. (404) 662-1503	Hello!	All PBXs that support a single lineset and have DTMF	PC	10,000	Configurable	20 ports per PC, but unlimited if PCs are networked	Function of the PC used	Yes	Yes, press any key	Yes	MTB, FD, TG, ON, ND	Starts at \$6,000
Executone Information Systems, Inc. Darien, Conn. (203) 655-6500	InfoStar/VX	Executone and Isoetec (DTMF inband)	Stand-alone	200	Configurable	8	12 hours	Yes	Yes, "0"	Yes, programmable	MTB, FD, TG, ON, ND	\$6,000 to \$40,000
Genesis Electronics Corp. Sacramento, Calif. (800) 458-5540	CINDI II, (Central Information Dispatch) Version 6	Most major brands	Stand-alone	512	3 min	8	172M bytes/21.6 hours	Yes	Yes, "0"	Yes, system administrator can set each user's retention to a minimum of 1 day and up to a maximum of 30 days for automatic deletion	MTB, FD, ON, ND ¹	Starts at \$10,850 for 2-port, 2-hour system; to \$33,200 for 8-port, 21-hour system (with many configurations in between)
Glenayre Electronics Atlanta (800) 866-4002	Modular Voice Processing System (MVP)	Central office integration	Stand-alone	25,000	35 min	128	8,424M bytes/492 hours	Yes	Yes, "0"	Yes	MTB, FD, TG, ON, ND	Starts at \$49,950 for 8-port, 22-hour system; up to \$600,000 for 128-port, 492-hour system
Hitachi America, Ltd. Telecommunications Division Norcross, Ga. (404) 446-8820	COMMplement VMS	HGX5000, DX Series, other manufacturers	Stand-alone	500	3 hours	8	80M bytes/6 hours	Yes	Yes, "0"	Yes	MTB, FD, TG, ON, ND	\$11,500 to \$33,000 installed; \$6,000 for optional advanced telemarketing system
Kerygma Technologies, Inc. Commack, N.Y. (516) 864-2357	Voice and Fax Messaging (VOFAX)	Those supporting 2-wire interface	Stand-alone	500 to 10,000	Unlimited	4 to 512	From 20 hours to 900 hours in 20-hour increments	Yes	No	Programmable by system administrator	MTB, FD, TG, ON, ND	Starts at \$18,000
Microlog Corp. Germantown, Md. (800) 562-2822	VCS 3500	Most major brands	Both types available	1,000	Default is 15 minutes, can be set to unlimited length	45 per chassis	680M bytes/50 hours (up to 180 hours in certain configurations)	Yes	Yes, "0"	Yes, default is 30 days	MTB, FD, TG, ON, ND ²	Ranges from \$15,000 to \$150,000 depending on the number of ports and type of software
Microvoice Corp. Irvine, Calif. (714) 859-1091	Voicecenter	Any with 2500 set capability	PC	65,000	4 min	24	360M bytes/32 hours	Yes	Yes, "0"	Yes, programmable	MTB, FD, TG, ON, ND	Starts at \$12,500 for 4-port system
Mitel, Inc. Boca Raton, Fla. (407) 994-8500	Mitel VX Voice Processor	SX-50, SX200 digital	Stand-alone	500	15 min	8	120M bytes/10.5 hours	Yes	Yes	Yes	MTB, TG, ON	From \$10,000 to \$27,000 depending on system size

FEATURES:

DTMF - Dual-tone multifrequency

MTB - Multiple broadcast. The same message can be delivered to multiple extensions.

FD - Future delivery. A message can be entered for future delivery.

TG - Call tagging. A message can be tagged "urgent," putting it ahead of nonurgent messages in the mailbox.

ON - Outside notification. A user can specify that a message notification be sent to a pager, cellular phone or other telephone when a message is left in a mailbox.

ND - Nondelivery. The voice mail system reports back to the message sender to say a message has not been picked up within a designated period of time.

FOOTNOTES:

1 - User can check to see if a message has been delivered.

2 - Sends confirmation when message has been delivered.

3 - Messages can be marked as urgent; system does not move them ahead of others in mailbox.

4 - Caller can request a return receipt.

SOURCE: NETWORK WORLD

(continued from page 49)

ries Voice Mail and Call Processing System, or AT&T's Integrated Solution II, generally include an add-on board that accommodates from one to eight ports for incoming telephone lines and voice-messaging software. Adding voice-messaging capability to a personal computer is the same as adding other communications products such as an internal modem or fax card.

Each plug-in board in personal computer-based systems has I/O ports to which telephone lines are attached. The personal computer runs a voice-messaging software program that sets up mailboxes — allocating disk space for each user — and performs administrative tasks for voice messaging. The board contains digital signal processing chips to digitize the voice message and convert it back to voice for playback. The processing power is usually supplied by the personal computer's CPU.

If several voice-messaging

sion or voice mailbox — requires that information about call progress be passed back and forth between the boards. Octel Communications Corp., for example, employs a distributed bus architecture to link the numerous voice-messaging applications.

The traditional trade-offs when choosing between personal computer-based and stand-alone systems have been system capaci-

ty, or the maximum number of phone lines a system can accommodate, and processing power. These points are becoming less important for the more limited store-and-recall voice mail applications. Today's personal computers have sufficient processing power to handle voice-messaging tasks. Additionally, net managers can overcome the relatively low number of telephone lines that

personal computer-based systems can accommodate by networking these systems together.

While the two types of systems are competitive when used for basic voice mail applications, stand-alone systems, having dedicated processors for each application, are better suited for handling integrated voice processing applications.

Personal computer-based sys-

tems are typically designed to be used only for a specific application, according to the vendors; they don't have the processing capacity for fully integrated applications.

"Integrated messaging platforms remain a very hot concept, but concept is the key word," says Marc Robins, president of Robins Press. Integrated messaging platforms involve combining voice

WITH OUR NEW ACD SYSTEM, YOUR AGENTS MAY NEVER SHOW UP FOR WORK.

"Integrated messaging platforms remain a very hot concept, but concept is the key word," Robins says.

▲▲▲

functions — voice mail, automated attendant, interactive voice response — are used in the system, all the plug-in boards still rely on the personal computer's CPU, which can bog down the system.

Personal computer-based systems could be used for other purposes, such as running a spreadsheet or word processing application, but because they are not multitasking, calls often go unanswered.

In contrast, stand-alone systems, such as AT&T Business Communications Systems' Audix or Comverse Technology, Inc.'s Trilogue Infinity are dedicated to voice-messaging tasks. In many cases, each voice processing function — for example, voice mail, voice response and automated attendant — is handled by a different board dedicated to the task. Each board, which has its own microprocessor, plugs into a slot in the stand-alone unit's chassis and is connected via a system bus.

Activating each function and passing control of the messaging system to and from the various functions — for example, when a call is passed from an automated attendant to a voice mail system directory to an individual exten-



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mail, voice response, call processing, facsimile and other services, such as electronic mail, on one platform or system.

"The idea is to integrate all of the functions so you can go back and forth between them, converting from one form to another," Robins says. An example of an integrated application would be to use voice processing as a front end for a fax document delivery

system, where a customer calls a company and requests that a price list be delivered to a fax machine. A more futuristic application might use speech-to-text or text-to-speech techniques for recording E-mail messages on a voice mail system or vice versa.

Companies using voice-messaging systems are already starting to see there is considerable advantage to combining data and

E-mail — as well as possibly audiotex applications and voice response systems — with telephone answering and voice messaging. For example, a Lotus Development Corp. spreadsheet can be sent via E-mail with a voice message attached to it. When the person gets the E-mail message, the spreadsheet points out the areas on which the sender wants the receiver to concentrate.

Integrating voice processing functions into a voice-messaging system requires a system architecture that allows users to add the capacity needed to handle voice processing functions. That means the system must have separate boards for each type of voice processing application used by the company — one for voice mail, one for voice response and one for the automated attendant.

And each board must have the power of an Intel Corp. 80386 microprocessor and a distributed bus architecture — for example, a VME bus that supports processing of multiple applications.

In addition, the system's bus must have enough bandwidth — a data transfer rate of 5M to 10M bit/sec, depending on the application — to allow communications between the applications in the system.

Integrating vendors

Vendors are approaching the integration of voice processing functions from different angles. Some vendors began in voice messaging, others in voice response data interface markets, others have specialized in paging or audiotex.

Now that these markets are maturing, the vendors with the most resources are looking at how to integrate these functions into their products.

"There's no fundamental technological reason why, on

Finding good agents is tough. That's why there's an advanced ACD system that includes a powerful recruiting tool—it lets you manage your agents wherever they work, even at home. It's DMS Meridian ACD from Northern Telecom, available through your telephone company.

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"The idea is to integrate all of the functions so you can go back and forth between them," Robins says.



an appropriate platform, these things cannot all be brought together," says John Higham, director of engineering at Octel Communications Corp.

One path to integration has been market consolidation. In 1989, a number of mergers and acquisitions occurred in the industry. Among them, Applied Voice Technology, Inc. acquired 1776 Corp.; Centigram Corp. acquired Speech Plus, Inc.; and Microvoice Systems Corp. merged with Voice Technology, Inc., according to Robins.

One reason for the consolidation is that few vendors have the resources to develop in-house expertise in all of the vastly different technologies that are required in developing integrated voice processing systems.

For example, improving the way information is stored on a voice-messaging system, such as the way disks are formatted or the way the information is compressed, requires technical skills more appropriate to handling data than voice.

The integration of functions is not happening overnight. The biggest challenge may not be solving technological problems, (continued on page 54)

NORTHERN TELECOM

TECHNOLOGY THE WORLD CALLS ON

NETWORK WORLD

Voice-messaging products (continued from page 51)

Company	Product	PBX(s) supported	PC-based or stand-alone	Maximum number of mailboxes	Maximum greeting message	Maximum number of simultaneous users	Disk storage/hours	Time/date stamp	Escape to operator	Autodelete	Features	Price
Northern Telecom, Inc. Santa Clara, Calif. (800) 328-8800	Meridian Mail line	Meridian 1, SL-100, and Digital Centrex	Stand-alone or integrated into PBX cabinet	10,000	99 min	48	240 hours	Yes	Yes, "0"	Yes	MTB, FD, TG, ON, ND	\$19,000 to \$200,000
Octel Communications Corp. Milpitas, Calif. (408) 945-3248	Aspen line of voice processing systems	More than 60 integrations including all major brands	Stand-alone	45,000	30 min	216 ports	Up to 912 hours	Yes	Yes, "0"	User can save messages indefinitely; system manager can configure a mailbox so that archived messages are deleted after any number of days	MTF, FD, TG, ON, ND	\$13,500 to \$588,000 (72-port Aspen Maxum, which serves 10,000 users)
Rolm Co. Norwalk, Conn. (408) 764-8378	Rolm PhoneMail System	Rolm models: 9751 BCS, 9722 Redwood, CBX 9000, CBX 8000; and many PBXs of other major vendors	Stand-alone	20,000 (12,000 additional mailboxes are available if they are used for PhoneMail Network profiles)	18 hours, 20 min	128 per system (8 nodes), times 50 systems in a PhoneMail Network	768 hours	Yes	Yes, by selecting "7" and then "0"	No	MTB, TG ³ , ND ⁴	\$28,000 for system with 4 ports and 1 disk
Soft-Com, Inc. New York (212) 242-9595	Diplomat Voice Processing system	Most major brands	PC	1,900	2 min	24	330M bytes/31.5 hours	Yes	Yes, "0"	Yes, programmable from 1 hour to 42 days	MTB, FD, TG, ON, ND	\$11,400 to \$55,950
Spectrum Communications and Electronics Corp. Hicksville, N.Y. (800) 828-8255	PX Voice Messaging Systems	Most major brands	Minicomputer-based	100,000	Configurable	50, up to 120 phone lines	350 hours	Yes	No	Yes, configurable for each user	MTB, ON, ND	\$35,000
Voicetek Corp. Chelmsford, Mass. (508) 250-9393	VTK-300	Most major brands	Integrated with host computer from workstation to mainframe	55,000	Determined by system used	64	1.2G bytes/100 hours	Yes	Yes	Yes, programmable	MTB, FD, TG, ON	Starts at \$50,000
Wang Laboratories, Inc. Lowell, Mass. (508) 459-5000	Wang OFFICE/Voice Mail 2.50	All major PBXs	Wang VS computer	Unlimited	Variable	Variable, depends on system		Yes	Yes, "0"	No	MTB, ON	Starts at \$8,000 (Wang VS not included)
Win Communications Corp. Hauppauge, N.Y. (800) 950-8946	MVP II	Marathon 100 D and 200 D	PC	184	Only limited by memory available	16	330M bytes/30 hours	Yes	Yes	Yes, time is programmable	MTB, ON, ND	Starts at \$5,500

FEATURES:

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FOOTNOTES:

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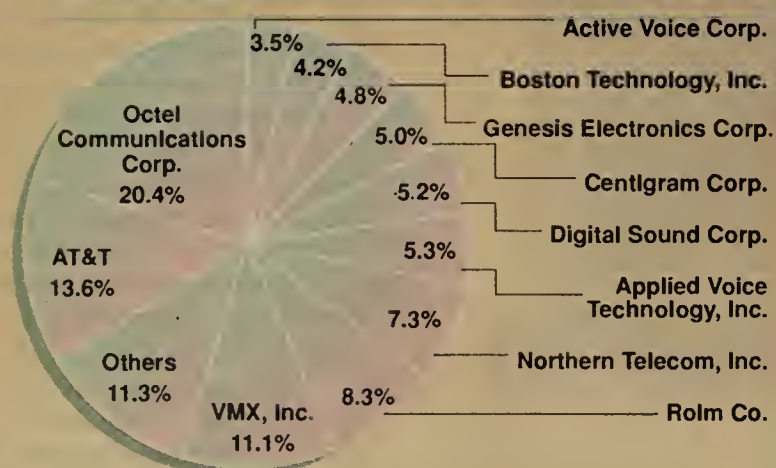
3 - Messages can be marked as urgent; system does not move them ahead of others in mailbox.

4 - Caller can request a return receipt.

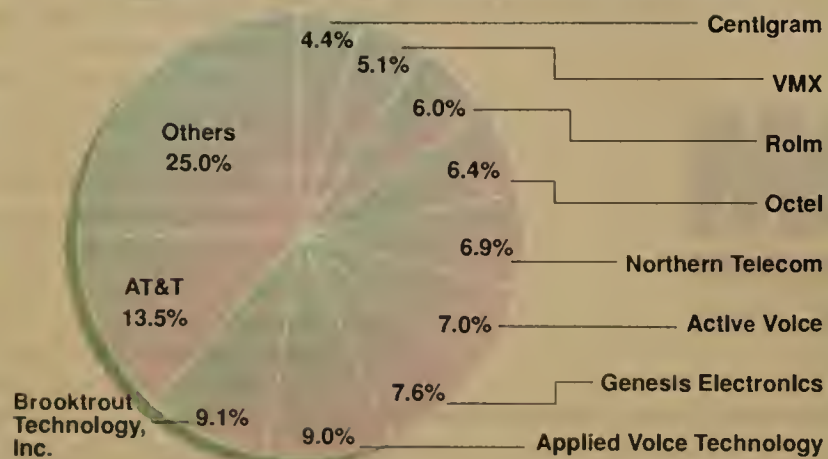
SOURCE: NETWORK WORLD

Voice-messaging product market

1989 U.S. market share by end-user revenue



Installed base: market share by systems shipped



GRAPHIC BY SUSAN SLATER

SOURCE: ROBINS PRESS, RIVERDALE, N.Y.

(continued from page 53)

but rather, promoting end-user acceptance of new technology. For instance, in companies where voice messaging has been available for a while, some employees are still using only the basic features of the systems.

Standards and applications

Standards should also help users integrate voice-messaging systems. Currently, two primary standards efforts are under way: the Audio Messaging Interchange Specification (AMIS) and the Voice Messaging User Interface Forum (VMUIF). (A future *Network World* feature will cover the status of these standards and the groups behind them.)

The goal of voice-messaging standards is to allow users to mix and match equipment and applications from different vendors, which until now have used proprietary protocols in their voice-messaging applications.

Work on AMIS, which has not yet been sanctioned by any standards governing body, began in 1987, when a group of users and vendors decided to tackle the issues of networking voice-messaging equipment from different

manufacturers. The VMUIF effort, which started last year, addresses the user interface. Both standards have been presented to ANSI for consideration.

While users wait for the resolution of these proposals, they are also waiting for applications. Analogies have been made comparing integrated voice processing with Integrated Services Digi-

plications and exploring ways to make the systems easier to use.

Vendors offer application development specialists, who concentrate on a particular vertical market, to help customers design a solution for specific application problems. For example, some specialize in applications typical of a university, where a voice processing system would be used for

Vendors are focusing on applications and exploring ways to make systems easier to use.



tal Networks — great potential, but few applications. In addition, companies may buy a system but not have the in-house expertise to integrate different voice processing packages, which compounds the problem.

This frustration has not gone unnoticed. In the past, voice processing vendors concentrated on the equipment. Increasingly, vendors are now focusing on ap-

registration by setting up voice mailboxes for students to call in and request courses.

Tying it all together

The integration of telecommunications systems and voice-messaging systems is a critical area that needs to be addressed if voice processing applications are to succeed. "Whatever you are (continued on page 59)

NEC modems keep information moving as if your life depends on it.



In a 911 emergency, to risk a communications breakdown is to risk a life. So if you don't want to take any chances, make sure your modem can handle the pressure in a crisis.

In Florida, NEC's I Series Intelligent Chassis System is now helping coordinate the life-saving efforts of Lake County's 911 services. The county chose the system after tests found NEC's I-Chassis modems outperformed others. And they've proved their round-the-clock reliability by being on the job there for more than a year without a single failure.



Since NEC modems are designed to rapidly and accurately transmit huge volumes of data, Lake County's 911 operators can now quickly pinpoint accident locations, provide traffic instructions, find patient medical records, and dispatch back-ups when needed. And because NEC's Dual Modem Card links 911's control center to NEC Dial-up Modems in remote locations, Lake County feels it has found the best data networking solution attainable.

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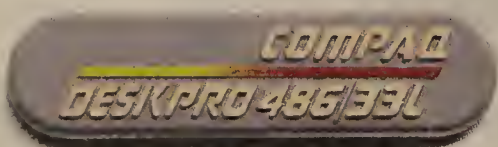
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(continued from page 54)

doing on an integrated platform, you have to interface and integrate with switches and PBXs," Higham says. "It's an area where there are not many standards, at least in dealing with interfaces to PBXs."

Robins says, "You need a very tight data link between the telecommunications system processor and the voice mail system processor for many voice processing applications."

For example, if call progress information can be passed back and forth between the two systems, the voice mail system must be able to tell the difference between a line that is busy and one that is ringing but not being answered.

Such closely coupled data links allow the voice-messaging system to determine line status, which is key to a system's ability to provide options to callers, such as call queuing, music on hold and alternate routing. "It allows users to develop a new range of functions around voice mail, without making someone call into the system four times to get four different functions," Robins says.

An example of an application made possible by the integration of switches and voice messaging is call queuing. With Applied Voice Technology's system, for instance, if you call someone's extension and the line is busy, the system gives you several options. A caller can wait on hold, leave a

such as these represent one of the biggest growth areas in voice processing, according to industry sources. "Voice response promises to leapfrog voice messaging as the leading voice processing

customer premises voice-messaging equipment. "The large service bureaus are smartly positioning themselves that way so they don't drop out of the business cycle," Robins says.

Many user companies new to voice messaging are starting with service bureaus.



application by 1995," Robins predicts.

Voice messaging continues to be the leading voice processing application, accounting for close to 50% of total voice processing revenue. And competition in the voice-messaging marketplace is heating up.

Major PBX and key system vendors such as Rolm Co. and Northern Telecom, Inc. are becoming active players in the field. Members of this group have well-established distribution channels, a large installed base and name recognition, which gives them a presence in the marketplace most independent voice processing vendors do not enjoy. Consequently, the group's market share — currently about 30%, according to Robins — doubled between 1987 and 1989.

Another trend in the voice-messaging marketplace involves the threat of competition from the regional Bell holding companies, which began providing voice-messaging service after U.S. District Court Judge Harold Greene ruled on March 7, 1988, that they could offer voice-messaging, gateway and E-mail services. The RBHCs are promoting their services as alternatives to customer premises equipment-based solutions ("Public net voice mail takes off," *NW*, July 16).

In addition, independent service bureaus offer voice-messaging services. Tigon Corp. of Dallas, for example, offers a variety of voice-messaging services to customers nationwide. Among the services they provide are two-way voice messaging, a menu-driven verbal bulletin board, a national message center and direct inward dial numbers to a call answering service.

Many user companies new to voice messaging are starting with service bureaus to see if the technology works for their particular applications. When user companies are satisfied that voice messaging is useful and economical (for example, does it allow customers to get needed information more easily than before?), they may buy their own equipment and discontinue using the service bureau, depending on costs.

Acknowledging this trend, many service bureau companies are beginning to sell and lease

Some vendors are moving into what many perceive as a more profitable market than customer premises equipment — selling to

service providers such as the RBHCs. Several voice-messaging equipment vendors — including Boston Technology, Inc., Digital Sound Corp. and Northern Telecom — have experienced explosive growth in sales, which analysts attribute to this trend.

One trend users should welcome is the declining prices of voice-messaging equipment. Last year's prices were generally 10% to 12% below 1988 prices.

In addition to lower equipment prices, more high-capacity — eight-port and larger — systems were purchased by end users in 1989.

The reason for this is that companies are using more voice processing functions in their organizations. Instead of straight

call answering, many are using automated attendant and some form of call processing simultaneously; each application requires a separate port.

This trend signifies that end users are just starting to fully understand voice messaging. Originally, the systems were used just to eliminate paper message slips. Companies didn't really see a role for voice-messaging systems in the automation of other types of information flow and in solving communications problems within the organization. Now, with the greater processing power and increased functionality offered by newer systems, users are learning to rely on voice messaging as an important daily business tool. ■

The benefits of voice messaging

The reduction of telephone tag is probably the most commonly cited benefit of voice messaging. However, it's only the tip of the iceberg.

Voice-messaging systems offer user companies improvements in communications, productivity and efficiency, as well as cost savings and increased revenue, according to Marc Robins, president of Robins Press, a publishing, market research and consulting company that focuses on voice processing and other telecommunications equipment markets.

Voice-messaging systems improve communications for user companies by:

■ **Reducing telephone tag and improving message content.** The information in a voice message is better than that in a quickly written message on paper, which means there's less need to call a person back with a question. The improved message content in a voice mail message may lead to fewer calls since some in the industry estimate that 50% of all calls are for the one-way transfer of information.

■ **Offering increased confidentiality and privacy.** Unauthorized personnel can't look at the message.

In addition, some productivity and efficiency improvements voice-messaging systems offer are:

■ **Shorter phone calls.** With voice messaging, people don't chitchat as much; they talk about business.

■ **Freedom from time zone differences and the constraints of 9-to-5 business hours.** "The more geographically dispersed offices are, the greater these benefits are," Robins says.

■ **Reduction in the number of message slips.** Message takers — usually secretaries and administrative assistants —

are thus free to do other more productive tasks.

■ **Less paging of called parties.** The disturbance of having to listen to the paging system every time someone is paged is avoided.

■ **Enhancements to paging systems.** "With traditional pagers, once you make the call, you have to wait for the person to find a phone and call you back," Robins says. With a voice mail system connected to a paging system, the voice mail system can be programmed so that a beeper is activated each time a new message enters a mailbox. The called party then calls into the system to play back the message.

Voice-messaging systems also save money and increase revenues because they cut phone costs by delaying the sending of messages to times when the lowest telephone service rate periods apply.

In addition, they reduce the number of switchboard operators through use of an automated attendant, thereby lowering labor costs, and they reduce the basic cost of getting the message across.

The cost of writing a memo is difficult to quantify, but it takes valuable time to compose, write, edit, reproduce and deliver a corporate memo. Producing and delivering a voice message takes only the time required to talk into the phone.

Quantifying the savings

Putting dollar figures on the cost savings associated with voice-messaging equipment is also difficult. Some benefits, such as the reduction in the number of memos written, are tough to quantify.

Based on Bureau of Labor statistics and some conservative estimates of phone usage, Robins calculates the cost savings of using a voice-messaging system

for a 100-person company to be about \$165,000 per year. A voice-messaging system for a 100-person company costs about \$50,000, so the payback is fairly fast, Robins notes.

The \$165,000 estimate is based on cost savings such as reducing phone bills through playing less telephone tag, making shorter calls and taking advantage of discounted rates. The estimate also factors in the cost savings of one less message center staffer, reducing the number of uncompleted phone calls, spending less time waiting on hold and writing fewer memos.

While the cost savings are always a consideration, the intangible benefits voice-messaging systems bring to a company may be more valuable. For example, Maine's American Automobile Association (AAA) office in Portland installed an AT&T Audix voice-messaging system in 1989. Before installing the system, calls frequently backed up. Some callers had to let the phone ring 40 times to get an answer.

The Audix system routes calls according to the caller's needs — emergency road service, travel arrangements or insurance coverage, for example — a function that used to be handled by two operators.

The voice-messaging system has cut call-handling time by more than 25%. Rather than requiring two full-time operators, the chore of answering phones now only requires half the time of one operator.

The voice-messaging system has enabled Maine AAA to provide better services to its members, according to William MacKenzie, president of the company. "Audix routes calls directly to the people who can help the caller, instead of piling up calls at the switchboard," he says.

— Salvatore Salamone

“Voice response promises to leapfrog voice messaging by 1995.”



voice message, keep retrying the line or try someone else's extension. The voice-messaging system also tells callers how many people are on hold ahead of them.

Besides tying into the telecommunications system, users also want to connect the voice processing system to a host computer. This offers users the ability to access a host data base using a dual-tone multifrequency phone.

Transaction processing, the most familiar application of this type, allows customers to order products by entering their account numbers and part numbers with their push-button phones. Other uses include dialing up for schedules or service information. A user could dial a service department number and "scroll" through a menu to get information about a specific product.

Voice response applications

(continued from page 46)

capability of internetworking using dissimilar computer architectures. TCP/IP can be used by local- and wide-area networks, as well as Unix and non-Unix environments.

For purposes of this article, the most interesting aspect of TCP/IP is that it considers both the data link layer (Layer 2) and the physical layer (Layer 1) to be

independent of the higher protocol layers. This means that you as the network implementor can decide which physical medium to use without being restricted by the protocol being used, whatever it may be. Accordingly, you can choose the actual method of data transmission without upsetting the other features of TCP/IP.

The IP part of TCP/IP provides the software programs to

route data among hosts on the network. It is also responsible for storing and forwarding data on the network. It generally corresponds to the network layer (Layer 3) of the OSI reference model. The task performed by IP can be simply to route a single packet of data, commonly called a datagram, or to send packets to a remote host across the country through several gateways.

The TCP part of the suite is to provide a reliable byte-stream-oriented virtual circuit for applications. In effect, TCP multiplexes simultaneous connections and generally operates at the transport layer (Layer 4) of the OSI reference model.

Because TCP is responsible for providing a dependable virtual circuit for applications, it allows services or processes within a

host to be referenced. TCP corrects transmission errors by retransmitting until the sending host receives confirmation via an acknowledgment packet from the receiving host.

Above the TCP layer, the TCP/IP suite has no parallel with the OSI reference model. This is because most of the layers above TCP in the protocol suite are user-level applications. This factor is especially important for network administrators who have existing equipment that must be interfaced to other similar or dissimilar equipment. It allows the user application to impose application-specific rules on the session and the data.

Four user-level protocols that TCP/IP supports are File Transfer Protocol, Simple Mail Transfer Protocol, Domain Name Service and Telnet, a virtual terminal protocol.

Installing TCP/IP

TCP/IP protocols are available for virtually all hardware in the marketplace today, from IBM Personal Computer XT microcomputers to the largest mainframe computers. This means

TCP/IP protocols are available for virtually all hardware.

▲▲▲

that internetworking of vendor-specific hardware is not only possible today, but inexpensive and relatively easy to implement — often with software that can be added to the network without affecting existing applications.

In addition, companies that install TCP/IP gain access to the four user-level protocols it supports. Hence, E-mail and the other user-level protocols are suddenly available to previously noncommunicative systems.

Before installing TCP/IP, companies should:

■ **Define communications objectives.** With TCP, as with all processes to be added to a system, thorough planning is required. The network administrator must review the company's strategic plan, along with the planned information resource management upgrades, and develop a phased implementation from the requirements defined.

Most importantly, TCP/IP solutions are near term — one to three years. The TCP/IP suite is currently the most robust transport-layer software available in the marketplace today. As such, it can be used with freedom and little thought to consequences.

Migration from TCP/IP to the OSI suite will be necessary in the future, and fortunately, several

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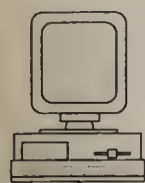
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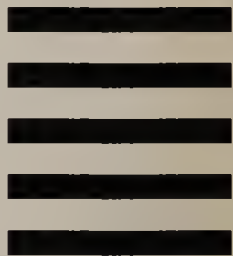


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migration paths are available to accomplish this movement.

■ **Analyze near-term needs.** In the planning process, the company should weigh the benefits of installing TCP/IP immediately against the benefits of a longer term migration to OSI.

If the organization has been operating without E-mail, virtual terminal service and file transfer for several years, waiting another year or two probably won't make a difference. On the other hand, migrating from TCP/IP to the OSI suite is not expensive or difficult. Each organization must consider these options in terms of its corporate needs.

■ **Formulate an upgrade schedule.** Once the preliminary planning is complete, the steps should be defined in an upgrade schedule so that activities are executed in the correct order. Also, because TCP/IP products are available through a variety of vendors, some price comparison should be done.

■ **Execute the plan carefully.** Although robust, TCP/IP products still require care in installation. Each connection must be validated within itself and with its neighbor system — that is, the

network card and TCP/IP software must work together correctly within a particular personal computer before that computer can be successfully connected to its neighbor.

Getting started

TCP/IP is not the solution for everyone. The network administrator should carefully evaluate the current system in juxtaposi-

tion to the perceived needs before making a recommendation. While TCP/IP will allow its user services to exist on the interconnected networks, it also requires additional user training and technical expertise.

The planning should determine both immediate and future equipment needs. All new equipment should adhere to the existing TCP/IP suite to allow easy

eventual migration to OSI.

A clear transition plan should be written and coordinated with all interested agencies to ensure that the solution meets expectations. The real benefit of interconnection is sometimes esoteric and seems impractical to many end users. Once in operation, however, the benefits of E-mail and fast file transfer far outweigh initial user reluctance.

Providing multivendor interconnectivity among your field offices can be a relatively easy project to handle. Using TCP/IP as an interim step toward OSI, all of the networks can not only be connected with mail, file transfer protocol and virtual terminal services, but interconnectivity can be accomplished using the existing equipment and adding only specific software. □

CROSSBOW IS LAN FLUENT

Letters

continued from page 41

exchange carrier central office and loop network in the same manner that the telephone company connects its interoffice fiber network to those facilities. It is the local exchange carrier that is being discriminatory when it refuses to provide potential competitors with the same interconnection it enjoys.

Ameritech's concerns are red herrings, just like the litany of scare tactics used by monopolists for the past 20 years to deny the public the benefits of competition. The real issue — and a reasonable one — is what do the RBHCs get in return for providing interconnection? Pricing flexibility? Price caps? Lifting of Modified Final Judgment restrictions?

The FCC should allow price caps only in local access and transport areas where competitive interconnection is available. After all, they are most effective in a competitive environment.

In addition, to allow pricing flexibility in advance of interconnection gives the RBHCs the opportunity to grab customers before they have a real choice.

Ameritech would have the public believe we are looking for special favors and special rates. Local common carriers are only seeking fair play. RBHC political efforts and Hollywood-sized publicity budgets to the contrary, competition will prevail.

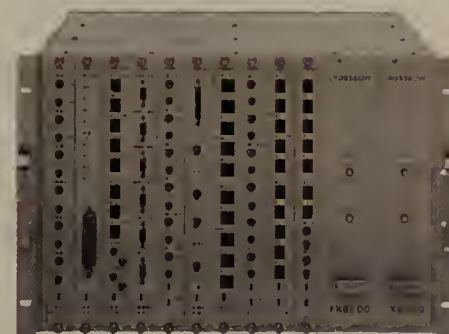
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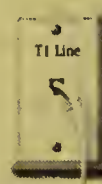
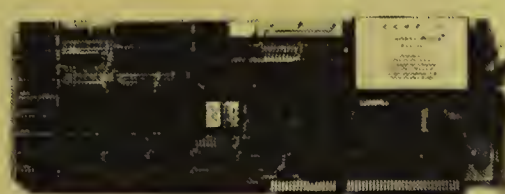
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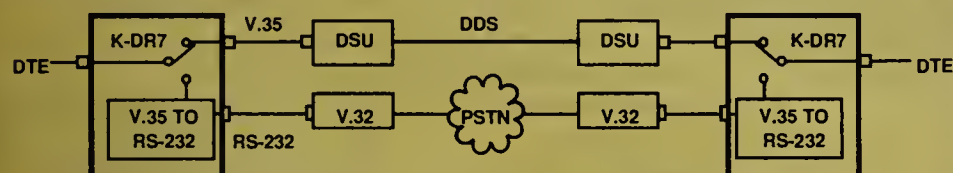
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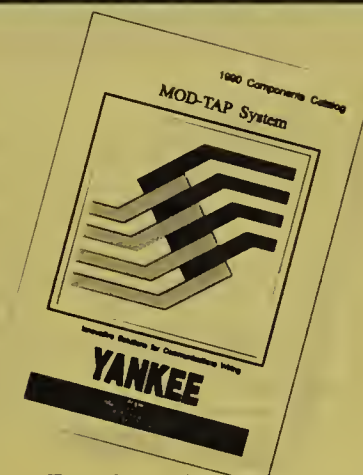
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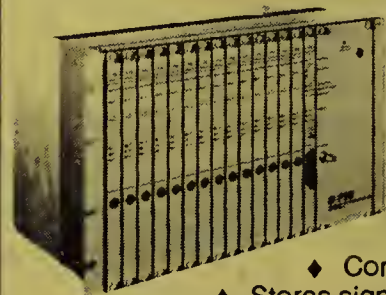
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GTE Spacenet Corporation 703-848-1000
Scientific-Atlanta, Inc.
Private Networks Business 407-255-3000

Wide Area Networks

Concentrators

Amnet, Inc. 508-879-6306

Network Switches

Amnet, Inc. 508-879-6306

Network World Third Quarter 1990 Editorial Features

August 13

Telecom Services Buyer's Guide:
BOC Calling and Travel Card Services

August 20

Network World/LanQuest LAN Test Series:
Remote LAN Access Software

August 27

Telecom Buyer's Guide: Voice Messaging Systems
Bonus: Harvey Study Issue

September 3

Trends Reshaping Networks: Evolving Standards

September 10

Network World/LanQuest LAN Test Series:
LAN Analyzer Performance Issues
Bonus Distribution: NetWorld Dallas

September 17

Telecom Services Buyer's Guide:
Comparison of Carrier Customer Service Organizations

September 24

Network World 5th Annual Budget Survey
Bonus Distribution: TCA

MCI boosts MCI View capabilities

continued from page 4

which would then relay the information via a dedicated 9.6K bit/sec line to the customer's mainframe running NetView. To deliver the service, MCI had to house a personal computer for each MCI View customer.

Stratus solution

MCI has scrapped the plethora of NetView/PC setups in favor of a Stratus Computer, Inc. System 68 fault-tolerant computer running NetView/PC, which can serve multiple MCI View customers simultaneously.

Simon said the Stratus computer is more reliable than a slew of personal computers and thus allows MCI to provide better service.

Jim Scarbrough, network operations manager at Texaco, Inc., a beta-test site for the enhanced service, said the offering is an im-

provement over previous versions.

"By the time we spot a problem using MCI View, MCI has already started resolving it," Scarbrough said. "Before, our standard reply to internal customers was, 'We'll get back to you because we don't know what our problem is.'"

Now Texaco staff can provide end users with an explanation of the problem, suggest a temporary solution and give them an estimate of when service will be restored.

MCI has also substantially reduced the price for the service. For either Vnet or TDS 1.5 application support, MCI View 1.5 carries a monthly charge of \$500, as opposed to the earlier version's charge of \$2,000.

For support of both Vnet and TDS 1.5, a monthly charge of \$650 applies, as opposed to the earlier price of \$2,500.

The service is currently available. ■

MCI accelerates net digitization

continued from page 4

digital microwave network. Under the new arrangement, WilTel and MCI will exchange capacity, not dollars.

WilTel President Roy Wilkens said the new contract may push the carrier's 1990 earnings 10% to 15% below their 1989 earnings, but he added that savings in capital expenditures for the network may offset a reduction in earnings.

"We were planning to spend millions of dollars to construct routes from Houston to L.A. and from San Francisco to Salt Lake City," Wilkens said. "With the MCI capacity exchange, we can

use MCI routes instead."

Daniel Briere, president of TeleChoice, Inc., a consultancy in Manchester, Conn., said US Sprint has focused its marketing efforts on transmission quality, while MCI has stressed advanced net management and calling services. US Sprint completed its fiber net in early 1988.

"US Sprint is losing its one big differentiator — its all-digital network," Briere said. "They didn't count on AT&T and MCI deciding to take huge write-downs for analog facilities and speeding digitization of their networks."

AT&T took a \$6.7 billion write-down in late 1988, which has enabled it to retire analog facilities and accelerate digitization of its nationwide network. ■

FTP unveils SNMP software

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tabular format. Finally, graph displays color bar graphs of one or more SNMP variables, such as the amount of packets received by and sent from an interface card.

Unlike more expensive management software offerings with graphical interfaces, SNMP Tools has a text-driven interface that requires operators to know SNMP commands.

Little competition

At least one other vendor, Network & Communication Technology, Inc. (NCT), has announced SNMP-compliant software that runs on a DOS-based personal computer ("SNMP added to facilities management pack," *NW*, Aug. 6).

NCT's product, Planet 2.0, features a graphical user interface and historical capture and display of statistics. NCT has not yet determined pricing for Planet

2.0, but its cost will be in the thousands of dollars, according to William Spencer, president of NCT. That product is expected to be available by year end.

FTP Software will also sell a developer's version of SNMP Tools, which can be used to build sophisticated add-on features to the core functions offered by SNMP Tools. The developer's version is being used by NCT in development of Planet 2.0.

While Unix-based SNMP offerings typically cost \$5,000 or more, SNMP Tools sells for \$300, according to Bruce Campbell, director of product marketing at FTP Software.

SNMP Tools is available now. The PC/TCP for DOS Development Kit, which is written in C, is available now for \$500.

Users of PC/TCP for DOS, the company's implementation of TCP/IP for DOS computers, can purchase SNMP Tools for \$100.

FTP Software can be reached by writing to 26 Princess St., Wakefield, Mass. 01880, or by calling (617) 246-0900. ■

GM, EDS work through years

continued from page 10

flamboyant EDS founder Henry Ross Perot, *Business Week* reporter Todd Mason writes that "open warfare broke out" when EDS began publishing lists of data centers to be closed and employees to be transitioned to its payrolls.

In the book, which is titled *Perot*, Mason says disgruntled GM employees slashed the tires of EDS managers, mailed threatening letters, placed hostile phone calls and forced EDS to assign guards to the home of Kenneth Reidlinger, the EDS executive vice-president assigned to manage the GM account.

Fireworks also flew at the top, where GM Chairman Roger Smith and Perot engaged in an acrimonious management battle that eventually forced GM to buy out Perot's ownership stake for \$700 million.

But with the retirement of Smith earlier this summer and



EDS-Net is managed primarily from this center in Plano, Texas.

the departure of Perot to form a new company, in addition to the passage of time, observers and GM employees say the relationship is finally settling down.

"There was a lot of apprehension and confusion, which I think happens anytime you go through a transition like that," said Jerry

Inboden, a manager of controls engineering for GM who worked closely with EDS on a multi-billion-dollar factory automation project shortly after the merger. "But now I think all that stuff is behind us, and we've gotten to the point where it's pretty much business as usual." ■

John Hancock completes cutover

continued from page 2

"We are pleased with the savings and flexibility of SDN," Wall said. "We see SDN as a possible step toward a Tariff 12 [arrangement] that would further reduce our costs."

Wall said the Tariff 12 package would cover SDN and 800 services and a major portion of the company's data lines. She declined to say when the contract will be finalized or estimate the savings John Hancock would realize from a Tariff 12 arrangement.

AT&T currently carries about 85% of John Hancock's long-distance traffic, with MCI and other long-haul carriers handling the remainder. Toll-free 800 services account for a major portion of John Hancock's business with AT&T.

"We can't take our 800 business to another carrier until our well-established 800 numbers become portable," Wall said.

But John Hancock has bargaining power with AT&T, Wall said. "They're interested in locking up as much market share as they can," she said. "Consequently, they're willing to negotiate with their top customers."

But before signing the contract, Wall said she wants assurances from AT&T that it will solve the billing problems John Hancock has encountered with SDN.

"The problems you face in an SDN environment will be carried over to the [Tariff 12] world," Wall said. "The move to SDN has been a tremendous learning experience, one that prepares us for Tariff 12."

The company has had late bills and problems obtaining call detail information for the last three months of service. "The billing has not been great," Wall said.

On one bill, AT&T charged the firm a 30-cent surcharge, instead of a 3-cent surcharge, for each 800 call made using SDN's Network Remote Access Express feature, Wall recalled.

The provisioning of SDN switched access to some sites was delayed, but not the late July cutover completion date, Wall said.

"The move to SDN has been a learning experience that prepares us for Tariff 12."

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More than 90% of John Hancock's SDN locations are switched access sites.

She said AT&T ran into problems working with local telephone companies when provisioning switched SDN access to John Hancock sites.

Carol Murphy, a communications consultant with John Hancock, said some telephone companies had difficulty processing

AT&T presubscription requests. "Some BOCs make the changes on time; others don't," she said.

The problems slowed the cutover of John Hancock sites from the initial 50 a week in April to 25 a week last month.

But despite the problems, Wall said, John Hancock is high on SDN, particularly its routing and calling card features.

Shortly after an Aug. 13 blaze in a Consolidated Edison Co. of New York, Inc. power station cut off electrical service to 4,100 customers in the city's financial district, John Hancock put SDN's Flexible Routing feature to work.

Using an on-site SDN Service Management System workstation here, a John Hancock staffer accessed a data base at AT&T's SDN Control Center to activate the service's Flexible Routing feature.

As a result, calls were routed around an office in the area that lost power to another facility for the duration of the outage, Wall said.

Employees here and the firm's field sales staff will benefit from SDN calling cards.

Calls made using AT&T's SDN calling card carry one-third the surcharge and cost 40% to 70% less than those made using the carrier's regular calling card, according to Wall. ■

Users review disaster plans

continued from page 4

of people are going to lose their jobs over this."

The disaster has also caused some firms to look more seriously at backup network and data facilities. Among them are members of the Wall Street Telecommunications Association, which

is planning to put out a request for proposal in a few weeks for a backup trading and data facility that could be used by members of the organization during an outage.

While this RFP had been planned before the blackout, Thomas Festa, president of the group, explained that interest in the facility has increased significantly. ■

IBM broadens AS/400 options

continued from page 1

TCP/IP, while LU 6.2 allows users to emulate IBM 5250 terminals for communications with AS/400 applications. The protocols can be supported simultaneously.

Ethernet adapters can reside simultaneously with Token-Ring adapters in those AS/400 models that have multiple LAN expansion slots, but the AS/400 does not bridge the LAN environments.

"The DEC world and the workstation world are pretty much married to Ethernet," said Jeff Rosenwald, a consultant with Communications Network Architects, Inc. in Washington, D.C. "It seems to me that IBM has opened the door to AS/400s becoming servers for workstation-type devices."

The Ethernet adapter should be available by Oct. 1.

Enhanced TCP/IP

In addition to Ethernet support, IBM enhanced the AS/400's ability to operate in multivendor networks by upgrading an optional TCP/IP software package to support the Telnet Virtual Terminal Protocol and X.25. The package did not previously support any wide-area communications protocols.

By adding support for Telnet, TCP/IP Connectivity Utilities will enable AS/400 end users to emulate a variety of terminal types when communicating with other computers that support the standard. Conversely, terminals or workstations attached to non-IBM hosts that support Telnet will be able to log on to AS/400s.

IBM has tested its implementation for compatibility with Apple Computer, Inc., Hewlett-Packard Co., Digital Equipment Corp., IBM and Sun Microsystems, Inc. hardware that supports Telnet.

X.25 support is required by TCP/IP users that want to connect to the Department of Defense's Defense Data Network and will also be useful for communications on an international basis, which often requires support for both TCP/IP and X.25.

The AS/400 platform itself supports X.25, Synchronous Data Link Control, asynchronous and other protocols.

Pricing for the new release of TCP/IP Connectivity Utilities ranges from \$2,275 to \$26,260, depending on the AS/400 processor used. It is scheduled to be available by Oct. 1.

The network product blitz included optional software that lets AS/400s communicate with IBM RISC System/6000s running AIX. IBM AIX AS/400 Connection Program/6000, software that runs on the AS/400, enables users of the RISC System/6000 workstation to access AS/400s as 5250 terminals.

A typical user of this software

might be running a computer-aided design application on the RISC System/6000 while requiring simultaneous access to related data in a manufacturing and process control application on the AS/400, said Suzi Shaw, advisory planner for laboratory market support at IBM Application Business Systems in Rochester, Minn.

IBM AIX AS/400 Connection Program/6000 supports IBM's Systems Network Architecture/SDLC and TCP/IP. The RISC System/6000 can reside on a Token-Ring or Ethernet LAN, or be linked directly via SDLC.

Scheduled to be available Nov. 16, the software will cost \$1,200.

The final LAN enhancement is support of 16M bit/sec Token-Ring LANs. The new 16/4Mbps Token-Ring Network Adapter for the first time enables the AS/400 to support the high-speed Token-Ring. In the past, the company offered only a 4M bit/sec interface. The 4M/16M bit/sec interface supports TCP/IP and LU 6.2. It ranges from \$885 to \$5,350, depending on the processor used. It should be available by Oct. 1.

"IBM has opened the door to AS/400s becoming servers for workstation devices."

▲▲▲

On the wide-area net front, IBM announced products that enable the AS/400 to function as a fax server and as an application platform for ISDN applications.

Fax functionality

The fax server capabilities are provided by IBM Facsimile Support/400, software for an AS/400 and a dedicated Personal System/2. The PS/2 functions as a fax controller and can accommodate as many as six IBM PS/2 FaxConcentrator Adapter/A cards, each supporting a single telephone line.

The products allow AS/400 users and LAN-attached users to send and receive faxes. The software running on the AS/400 ranges in price from \$820 to \$7,000, depending on the AS/400 model. The PS/2 software costs \$200, and a single adapter for the PS/2 costs \$2,395. The software is expected to be available by April 1991, while the PS/2 adapter should be available by January 1991.

IBM also announced that Teleos Communications, Inc. of Eatontown, N.J., has developed hardware that works in conjunction with an IBM Application Program Interface to allow AS/400s to support ISDN applications (see "Teleos AS/400-to-PRI link supports voice/data/video," this page). ■

Teleos AS/400-to-PRI link supports voice/data/video

By Tom Smith
New Products Editor

EATONTOWN, N.J. — Teleos Communications, Inc. last week unveiled a device that links an IBM AS/400 to ISDN Primary Rate Interface (PRI) lines, enabling the minicomputer to support integrated voice/data/video applications.

The product, IRX9000 ISDN Resource Exchange, works in conjunction with IBM's CallPath/400, which supports computer-to-switch applications. Users and developers can use CallPath/400 to build applications that support peer-to-peer communications between the Application System/400 and the IRX9000 over a 4M bit/sec token-ring local-area network.

Bidirectional communications between the AS/400 and the IRX9000 will enable the minicomputer to utilize signaling information from the PRI link for such applications as intelligent call routing, according to Teleos.

The product also provides interfaces for customer premises equipment such as telephones, switches and imaging and video devices.

In addition, the IRX9000 features LAN bridging software that enables an IBM Token-Ring Network to communicate with as many as 32 remote Token-Rings.

The IRX9000 is targeted at users with telemarketing operations supporting between 10 and

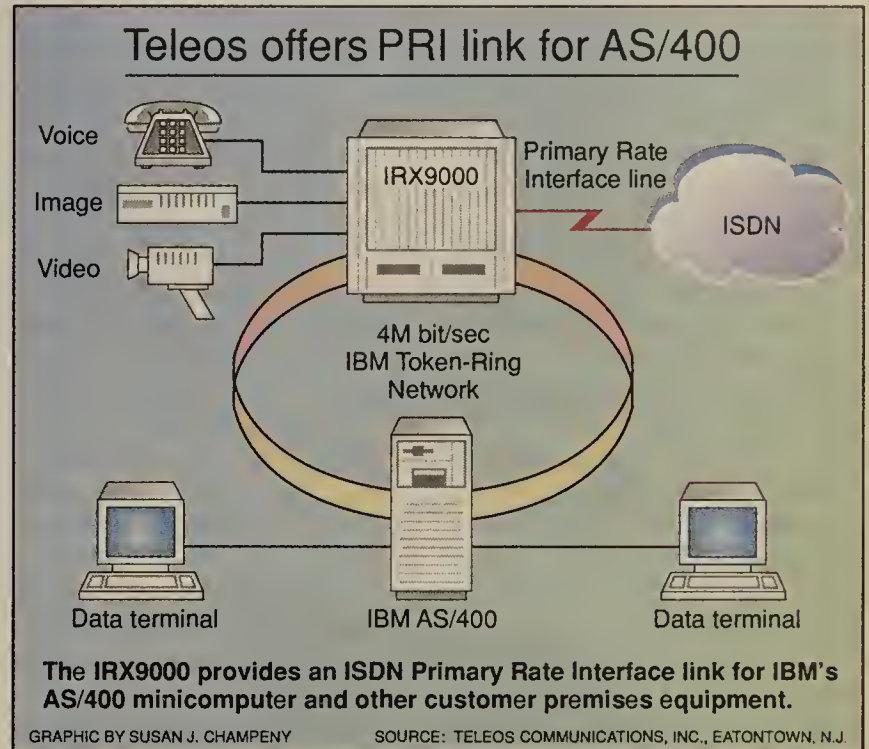
80 agents, according to Tim Rubert, senior product manager at Teleos.

It is not intended to replace high-end private branch exchanges or automatic call distributors (ACD), but it will support many of the call routing functions

AS/400 through IBM's LU 6.2 peer-to-peer communications protocol. The 20-slot unit supports four Token-Ring interfaces, while the six-slot chassis supports two.

On the front end, the device supports as many as 16 PRIs. A PRI divides the capacity of a T-1 line into 23 64K bit/sec voice or data channels and one 64K bit/sec signaling channel.

On the back end, ISDN and non-ISDN customer premises



currently handled by ACDs or low-end switches.

Teleos' product is offered in six- and 20-slot configurations supporting a variety of interfaces for LANs and customer premises equipment. It is linked to the AS/400 through a 4M bit/sec IBM Token-Ring Network and supports communications with the

equipment, such as telephone sets and PBXs, is linked to the IRX9000 through Basic Rate Interfaces (BRI) and T-1 interfaces. A channel bank is required to link non-ISDN gear to a T-1 line that terminates on the local side of the IRX9000.

BRI provides two 64K bit/sec (continued on page 70)

IBM unveils AS/400 models

NEW YORK — IBM's AS/400 network introductions last week were part of a larger announcement of new models of the minicomputer, including an entry-level machine based on the System/36 architecture that can be upgraded to an AS/400, as well as two other low-end AS/400s.

Unlike the existing System/36-based Application System/Entry 5363 Model S10, the new Application System/Entry 9402 Model Y10 can be upgraded to a low-end AS/400.

The machine offers 1M to 2M bytes of system memory and 160M to 640M bytes of disk storage. It supports a single 4M/16M IBM Token-Ring Network interface and 14 to 28 workstations attached via twin-axial cable.

Pricing starts at \$11,000, and users can upgrade to a larger AS/400 for \$10,500. The Model Y10 is scheduled to be available Oct. 26.

Entry 9402 Model Y10 users that upgrade to a larger AS/400 will move to the larger of two

new low-end systems, the AS/400 9402 Model C06. The other new low-end system is the Model C04. In a base configuration, both 9402 processors support 8M bytes of main memory and 640M bytes of disk storage.

The Model C04 can be upgraded to support 12M bytes of main memory and 960M bytes of disk storage; the C06 can support 16M bytes of main memory and 1.28G bytes of disk. Both models support a single Ethernet or Token-Ring interface. The C04 can support 14 workstations via twinaxial cable, and the C06 can support 54.

The C04 starts at \$14,500, while the C06 starts at \$17,500. Both 9202 models are scheduled to be available by Oct. 1.

The mid-range and high end of the AS/400 line were enhanced with increased storage capacity.

IBM boosted the mid-range AS/400 9404's disk storage capacity by 50%, to 3.84G bytes, while the high-end 9406 now supports a maximum of 54.8G

bytes of disk.

In addition, a new 32M-byte main storage feature for the 9406 Model B70 doubles main memory capacity to 192M bytes. IBM also doubled the number of LANs that can be supported on the 9406 models, from two to four. The LANs can be a mix of Ethernet or Token-Ring.

Upgrades to the Model 9404 and Model 9406 should be available by Oct. 1.

Concurrent with the release of the new AS/400s, IBM announced a new version of the minicomputer's OS/400 operating system that includes new capabilities of SQL/400, IBM's implementation of the SQL data base standard that runs under OS/400.

SQL/400 now supports nested queries, which allow users to include related data requests in a single query rather than making multiple requests.

Processor-based charges for SQL/400 range from \$1,050 to \$1,730. The product is scheduled to be available Oct. 1. ■

T-1 mux makers boost abilities

continued from page 2

technologies," said Ken Starkey, associate director of communications for Bear, Stearns & Co., Inc.

Bear, Stearns employs 24K bit/sec compression over NET multiplexers on its backbone network, as well as 16K and 8K bit/sec compression via Newbridge Networks, Inc. multiplexers that support the flow of international traffic to and from the backbone.

Compression procession

Voice compression makes more efficient use of existing bandwidth by making it possible to digitize voice signals using 32K bit/sec speed or less instead of the standard 64K bit/sec pulse code modulation.

During the past 12 months or so, many of the major T-1 equipment makers have enhanced their voice compression offerings. Those that have not are expected to do so soon.

Newbridge was ahead of the pack last summer when it came out with an 8K bit/sec voice compression offering.

Last May, NET announced a voice compression offering, the High Density Voice Compression module, that supports voice digitization at 8K and 16K bit/sec. NET just started offering the modules for its Integrated Digital Network Exchange multiplexers on a controlled basis and plans to

begin volume shipments by year end, a company spokeswoman said.

Timeplex, Inc., which declined to comment on its plans, is expected to offer new 8K bit/sec voice compression capabilities in the near future, observers said. Currently, Timeplex supports 16K bit/sec, or 4-to-1, compression on its Link+ line of multiplexers and offers a microprocessor-controlled unit called the LINK Packetized Voice Subsystem that boosts voice compression ratios up to 10-to-1.

Infotron Systems Corp. said it plans to unveil at the Tele-Communications Association, Inc. Annual Conference next month in San Diego an interface card for its Infostream NX series of T-1 multiplexers that will support voice signals at 6.5K, 8K, 16K or 32K bit/sec, according to company officials. Infotron currently offers voice support at 16K bit/sec, said Mark Luczak, senior network specialist at the company.

He added that Infotron's decision to offer enhanced voice compression is largely a reaction to users moving voice traffic from their private nets to a new breed of more cost-effective public net services.

"Software-defined networks are coming down in price. That's why users are moving toward switching voice traffic from private networks," Luczak said.

"That trend will continue if T-1 equipment vendors don't re-

spond," he said.

David Owen, NET's director of strategic marketing, said private T-1 nets in the U.S. using 16K voice compression "compete favorably on a cost basis with [virtual network] tariffs."

Analysts aren't so sure.

"Some of the virtual network offerings are pretty attractive, offering rates of about 6 cents per minute, compared to private net rates of about 9 cents a minute," said Rosemary Cochran, a principal at Vertical Systems Group, a Dedham, Mass., consulting firm. "It's purely economics."

Even when T-1 multiplexer vendors upgrade their voice compression ratios, carriers can counter by lowering their rates for virtual net services, said Berge Ayvazian, a vice-president at The Yankee Group, a Boston market research firm.

Owen said the primary reason NET is improving its voice compression is to capture a bigger chunk of the international market. "The driver for us is international," he said. Private lines cost at least 10 times as much overseas as they do in the U.S., which means that "it is mandatory to have at least 16K compression."

Rich Reinhold, a product manager at Newbridge, agreed.

"More networks are growing into multinational networks, and [users] are adding feeder nodes overseas," he said. "We definitely have to pack more into the existing bandwidth." □

FCC: AT&T is regaining

continued from page 1

Rival vendors MCI Communications Corp. and US Sprint Communications Co. said the FCC figures show that AT&T still retains dominant market share, although neither said the numbers necessarily signal a trend. Officials from both companies said the numbers prove that AT&T is able to compete effectively without lessened regulation.

Analysts and the FCC also predicted that the rapid decline of service prices since divestiture has ended. A major factor causing prices to level off, according to the report, is that subscriber line charges have been frozen at \$3.60 so carriers will not have any access savings to pass on to users. The FCC report said that on an annualized basis, long-distance prices fell 2.9% during the first half of 1990.

Marketing success

AT&T's improved market share may be due in part to its marketing efforts for large customers. During 1989, AT&T aggressively sold its Software-Defined Network service, more than quadrupling its user base from 119 to 500.

AT&T was also successful in selling custom network packages under Tariff 12, signing up 26 customers to multimillion-dollar deals lasting between three and five years in 1989 and signing 30 more in 1990. Additionally, AT&T filed eight discounted service deals under Tariff 15 during 1989 and 1990.

AT&T also launched an aggressive marketing and advertising campaign aimed at smaller businesses and residential accounts.

According to Joaquin Gonzalez, vice-president of global networking strategies at the META

Group, a consulting firm in Westport, Conn., AT&T's marketing tactics are beginning to pay off and he expects the company to continue increasing market share in switched services. "I don't think this is necessarily a healthy and wonderful thing for the industry, but I do see it as a trend," he said.

The problem, according to Gonzalez, is that AT&T "was able to stop its [market share] decline at a point where it can exercise enormous market power." He said market dominance is generally measured in terms of the ability to drive prices marketwide, and in many industries, that occurs with market share of 30% to 40%. AT&T has twice that level, he pointed out.

Jeff Close, a telecommunications analyst with DMW Group, Inc., a consulting firm in Stamford, Conn., said he agrees that the era of the price decline has come to an end, but he disagrees that AT&T's move to win back market share could hurt users.

"I see a change in the trend of AT&T losing market share, but I don't think it will go drastically in favor of AT&T," he said. Until now, users have been the big winners, with specialized deals and much lower prices being offered by competing carriers.

The only concern is that AT&T, by focusing so heavily on marketing, might begin to sacrifice service quality, Close said.

Mary Johnston-Turner, a principal with Northeast Consulting Resources, Inc., based in Boston, said she agrees that service quality may become a bigger area for concern if carriers drive down prices any further in an effort to win market share.

"It's getting to the point where users are starting to ask whether the carrier can give them the quality they want at such [a low] price," Johnston-Turner said. □

HP minis get server role

continued from page 1

ing existing MPE applications, said John Logan, vice-president at the Aberdeen Group, a consulting and market research firm in Boston.

Michael Goulde, an analyst with the Open System Advisor, a consulting firm in Boston, said the quality of communications software will set one minicomputer vendor apart from another in today's market.

"It is very difficult in these times to differentiate yourself on the basis of your hardware," Goulde said. "Software support as well as the ability to integrate with other vendors' systems is really the race now."

Among last week's announcements, HP said that a version of NetWare that runs under MPE/XL on its HP 3000 Model 900 will begin shipping in the spring. The package, called HP NetWare/XL, will enable HP 3000s to handle NetWare file- and print-sharing functions as well as support NetWare administration and management capabilities.

HP NetWare/XL also said it will support NetWare's Sequenced Packet Exchange (SPX) protocol, which will enable HP, third parties and users to write NetWare server applications for the HP 3000. This will allow mi-

crocomputers running HP NetWare/XL client software to access applications and data on HP 3000s.

A virtual terminal capability being built into HP NetWare/XL will enable NetWare clients to emulate HP terminals in order to run HP 3000 applications.

HP NetWare/XL server software will cost between \$5,900 and \$31,200, and HP NetWare/XL client software is priced at \$350 per microcomputer.

Named Pipes support

HP also said the HP 3000 Model 900 will support Named Pipes, an interprocess communications facility used in LAN Manager.

This will enable developers to build client/server applications that allow microcomputers running LAN Manager client software to access data and processing services on the minicomputer.

Pricing and availability will be announced early next year.

In addition, the company said HP 3000s will support distributed computing applications based on the Network Computing System (NCS) developed by HP's Apollo Division.

Pricing and availability for NCS support will also be announced early next year.

HP increased support for TCP/IP on the HP 3000 with the introduction of HP Advanced Research Projects Agency (ARPA)

Services/XL. The package will enable HP 3000s to exchange files with other vendors' systems using TCP/IP's File Transfer Protocol.

It will also allow HP 3000-attached terminals to access other vendors' hosts using TCP/IP's Telnet Virtual Terminal Protocol. HP ARPA Services/XL costs between \$1,100 and \$16,600 and is expected to ship in October.

The company also unveiled a pair of packages that allow HP 3000s to exchange files with Government OSI Profile-compliant systems over X.25 or 802.3 nets. HP File Transfer, Access and Management (FTAM) 3000/XL software supports OSI's FTAM protocol and is priced between \$4,600 and \$25,000.

HP OSI Transport Service 3000/XL software supports OSI's Transport Class 0, 2 and 4 protocols and costs between \$5,800 and \$31,000.

Both are expected to be available in the second quarter of 1991 and are subject to price changes in early 1991.

Goulde said the announcements are an important move by HP. "HP is trying to say, 'We are your open systems vendor. [Working toward] open systems is not just an afterthought; it is central to our strategy.' And then they frosted that with a sprinkling of related products." □

AS/400-to-PRI link supports

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voice or data channels and one 16K bit/sec signaling channel.

Software developed by users and third-party application vendors will manage communications between the AS/400 and the IRX9000. Teleos software enables the IRX9000 to support a variety of CallPath commands such as hold, redirect and transfer.

In a typical application, the IRX9000 will pass ISDN automatic number identification (ANI) data to a customer information data base on the AS/400. Based on information in the caller's data base record, the AS/400 can instruct the IRX9000 to route the call to a specific service representative.

With typical computer-to-switch applications, by contrast, the AS/400 receives the ANI in-

formation and sends the customer data to any available service representative's screen, while an ACD would then route the call to that agent. The ACD would not use information in the data base file to route the call to a specific agent.

A software option offered with the IRX9000 enables it to function as a Token-Ring LAN bridge. Users need to install a second Token-Ring Network interface card that acts as the bridge. That card runs software that enables another Token-Ring interface card to access as many as 32 remote Token-Ring sites.

A Token-Ring source routing address is converted to an ISDN telephone number by the bridge.

The IRX9000 will be generally available by March 1991, when CallPath/400 is expected to become generally available. IRX-9000 pricing will range from \$45,000 to \$100,000. LAN bridging software costs \$5,000. □

by Paulina Borsook

Alan Huang

As head of optical computing at Bell Labs, Huang harnesses the power of light to solve communications problems.

As a child, AT&T Bell Laboratories' Alan Huang used to bring home stray television sets instead of dogs and cats. The San Francisco-born, Connecticut-raised head of optical computing at Holmdel, N.J.-based Bell Labs cut lawns to buy relays from junk shops and built others out of neon bulbs. In a way, Huang, who learned English by watching television as a child, might have been thinking about using light to carry information even then.

The optical computer that the 41-year-old Huang introduced to the world in January 1990 uses lasers and lenses to perform computing tasks, an example of what Huang calls "getting bits of light to do our bidding." In Huang's view, "the last 30 years of prosperity were based on electronics. The next 30 years will be based on photonics."

Optical computers such as Huang's may be particularly useful in telecommunications because light beams, unlike the streams of electrons used in conventional computers, can intersect with no loss of data. Highly interconnected photonic computers may not only be better at solving problems involving large quantities of data but may also be ideal for handling switching transactions required to route millions of telephone calls.

Huang, who received bachelor's and master's degrees in electrical engineering from Cornell University and a Ph.D. in electrical engineering from Stanford University, says he thinks optical computing can resolve the switching logjams that can arise at the heart of any communications system.

"A bit in a computer is born and dies in the space of a few hundred microns, but a bit in a communications network can travel hundreds of kilometers," he says. "So in a conventional computer, we think about the expense of giving birth to and killing a bit, how efficiently we can do the logic." Where communications is important, "we now have to think about how to do logic *and* move the in-

formation," Huang notes.

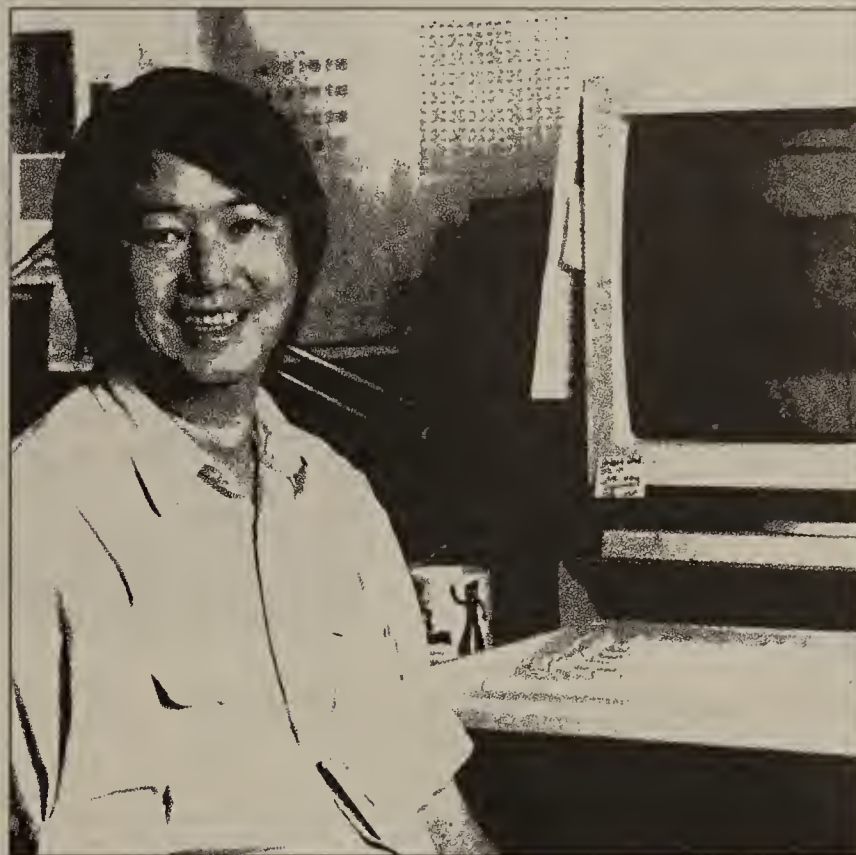
Light is already being used in the AT&T 5ESS central office switch to connect circuits, and Huang says he believes that "we now need to go down to the chip-to-chip, gate-to-gate and transistor-to-transistor level. In the 1950s, the government prohibited Bell Labs from developing general-purpose computers, so the laboratory was forced to focus on specialized telecommunications computers, and other [companies] focused on general-purpose computers. Now the two are converging because communications both inside and outside a machine is a big issue."

Referring to the proliferation of fiber-optic nets throughout the communications industry, Huang says that "networking already uses the power of light. It has revolutionized city-to-city communications, and in networking [projects] large and small, fiber optics is taking over."

To Huang, the bottleneck in computing is found within each computer's internal communications network. Intracomputer communications bottlenecks are similar to the problems of computer communications to the outside: "It's no longer enough to have this great Unix box; you want to know how it ties in [with the net]."

Huang sees real-world pressures driving the development of optical computing, particularly in networking, because communications is currently at "an awkward stage, half electronics and half photonics. There are now countless electronic-to-photonic conversions that go on throughout communications networks." He is referring to, for example, the multiple translations between fiber links and electronic central office switches that can take place in a single long-distance call. "We need to stop this because it's so inefficient," he says.

However, there is a higher purpose to Huang's 20-year obsession with the futuristic technology of optical computing. Huang felt it was important that, through the auspices of Bell Labs, the U.S. produced the world's first functional optical computer.



"Americans are surprised that we can do anything first anymore. I wanted to show that new things can still be done," he says.

"We're a nation of immigrants and dreamers. We're good at it, genetically bred for dreams," he continues. "We were not founded by accountants and lawyers worshipping paper. We're not putting enough money into research and development, and we act like we can buy what we need elsewhere."

Huang considers cabling of fiber to the home to be the next step in a communications path the U.S. has been taking for the last hundred years. "Fiber to the home could be like the building of the highway system," he says.

Huang also sees another, "very cynical reason" to construct fiber to the home: "Fiber to the home is an infrastructure that can't be taken out of the country or sold."

As a visionary researcher, Huang confesses to feeling "like an endangered species. Technology can really help, but we are too often portrayed as the bad guys." With the capacity optical computing offers for "pushing from the impossible to the possible, computers will be able to bend over backwards to help people," Huang says.

Aside from his work on optical computing, Huang has also applied for a patent on what he calls "computational origami." A method of pushing bigger calculations into smaller ones, scheduling operations so that "nothing gets lost and everything arrives

just in time," computational origami interconnects or folds computer functions into highly intricate but regular patterns. For example, computational origami can be used to reduce the complex calculations involved in parallel processing. In 1987, Bell Labs named the patent application for Huang's "Just In Time" computational origami as one of the five best at the lab that year.

A self-described nerd who says he "has the the most fun when sitting in front of a computer," Huang says his mother tells a story about him crying as a young child when taken away from his first glimpse of a computer at a science museum. Huang built his first computer at the age of eight and won a science fair prize for one he built when he was 10.

Yet Jacquelin Orsagh, an English professor at Tristate University in Angola, Ind., who attended Cornell with Huang, says, "I have a hard time imagining Alan sitting at a computer, for he is one of the most well-rounded people I know." However, she adds, the way he looks at things "can make you nervous. He always wants to know how things work. He'll come to my house and change the VCR changer so it works as a remote control or take apart my combination salt-and-pepper grinder, just to see how it works."

A travel enthusiast who has been around the world three times, Huang likens exploring other countries to working at Bell Labs; in both situations, he says he's able to find "a new vision into the ordinary." ■

Borsook is a free-lance writer based in Berkeley, Calif.



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